AMERICAN CINEMATOGRAPHER

The Motion Picture CAMERA Magazine

OCTOBER, 1934

Published in Hollywood, by American Society of Cinematographers

this issue

Chemical Forms
Aeroplane Camera Mounts
New Deal for Newsreel Men
Riddle Me This
. . . and other features

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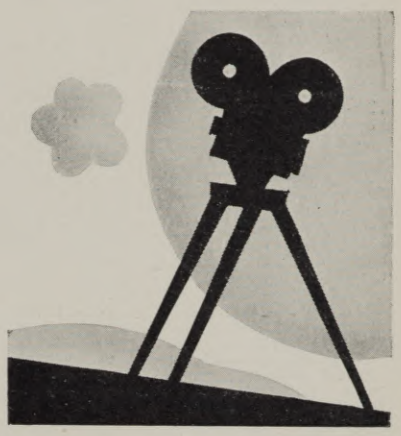
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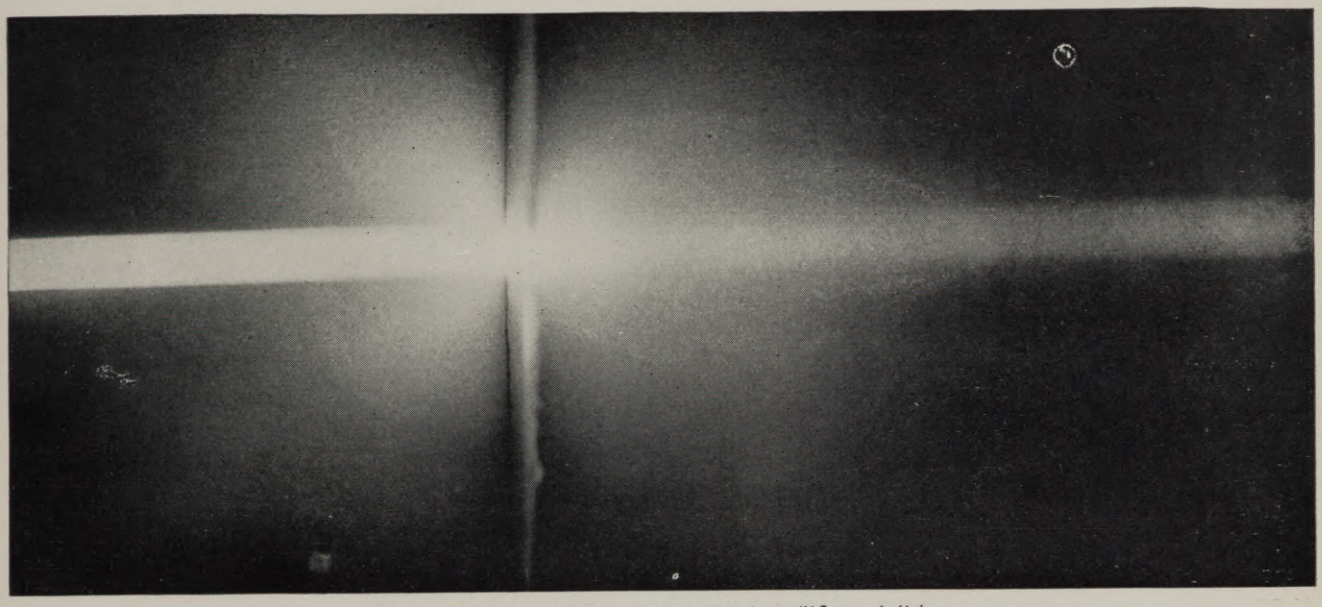
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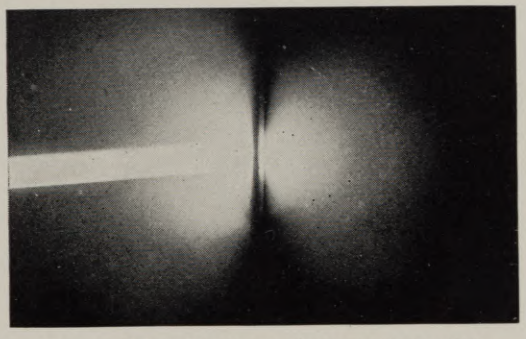


The camera tells General Electric's scientists how silk controls light

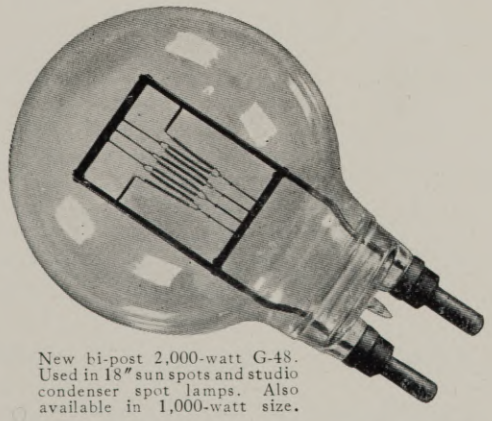
SILK, as cinematographers well know, is the most commonly used material for spreading the light to soften shadows, and for diffusing light to eliminate "hot spots". It helps you control light quality and intensity. It transmits from 65 to 75% of the light and effectively conceals the bright filament. The photo above shows how it distributes the light. Very similar characteristics are shown by ground glass and pebbled glass.

In white opal glass, as the companion photograph indicates, much better diffusion is secured but light transmission is reduced. This material transmits about 50% of the light directed at it.

Directly, these facts about translucent materials bear little relation to lamp making. But they play a very important part in light control, a fundamental of illumination in cinematography as in home, factory or office. Hence G-E engineers and scientists study the characteristics of all translucent materials.



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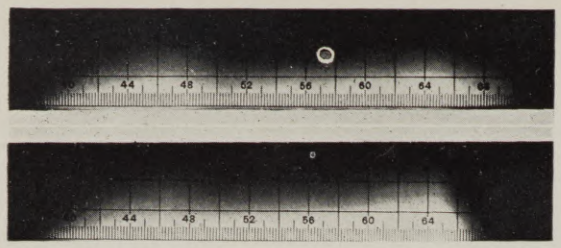


Fig. 1. Spectrographs of Eastman Panchromatic film Type 2 (above) and Superspeed Panchromatic (below).

Chemical

ONCE in a while, the question of focusing differences, commonly called "Chemical Focus" comes to the front in cinematographic practice and although much has been written in the near past on the subject, it appears that it may not be amiss to once more discuss its fundamental effects and the part that they play in everyday cinematographic procedure.

It is obvious that the photographer and the cinematographer strive to obtain a photographic reproduction of an object with all possible fidelity with regard, especially, to modeling and the distribution of lights and shades that best correspond to the visual impression produced by the subject, except for the rare cases in which a distortion of the visual impression serves to emphasize a dramatic mood or inhance some essential, and all-important, details to the detriment of others.

All branches of photographic research have bent their efforts to satisfy the requisites of fidelity in reproduction which involve, mainly, the characteristics of photographic emulsion sensitivity, those of the light used in illuminating the subject and those of the image-forming optical system, and their relation to the sensitivity of the eye for the light radiations emitted by the subject.

In a quite complete and very comprehensive paper (*1) Loyd A. Jones has shown that the visibility function of the eye is far from even approaching the spectral distribution of sensitivity of one, or any photographic emulsion, and the relation between photographic sensitivity and the distribution of light energy in daylight.

In another paper (*2) Mr. Jones demonstrates the relation between photographic sensitivity and the distribution of energy in incandescent filament (Mazda) lights and for both cases he includes the absorption characteristics of the glass of the photographic lens.

These demonstrations make quite obvious the fact that by controlling the condition of illumination with respect to the sensitivity characteristics of the film emulsion, one could secure a photographic record very closely approximating the visual impression made by the subject on the onlooker. In actual practice, however, it is quite impractical to secure perfect tone reproduction because the density of the filter that should be used would be entirely too great to be in keeping with the average exposure time used in studio photographic procedure.

The cinematographer is then confined to as close an approximation of color value renditions as is compatible with the means at his disposal.

Theory and general practice suggest for general work the use of panchromatic films and a yellow filter of the K series for daylight exterior work, and that of unfiltered incandescent filament (Mazda) lamps for interiors.

Following Mr. Jones' discussion, it is quite easy to determine, with a fair degree of accuracy, the range of the band of spectral colors that is called to form the photographic image with due consideration to the sensitivity of the emulsion, the light-transmitting characteristic of the filter and those of the illuminant.

Since Mr. Jones' work was published, a new type of film emulsion has been introduced to the cinematographer and is now widely used. This is the supersensitive emulsions commonly referred to as super-pan.

Since no quantitative data are available at the present time for this type of emulsion, the spectrographs illustrated in Fig. 1 will serve as a guide for an understanding of the relative response of the supersensitive emulsion to the various light wave lengths as compared with the response of panchromatic type 2 Eastman film, mainly dealt with by Mr. Jones.

It is clearly seen that the sensitivity of supersensitive emulsions does not extend as far into the red as does the panchromatic, but shows a pronounced peak at approximately wave length 650 mu, which nearly corresponds to the C. Fraunhofer line of the solar spectrum.

It is to be remembered that the apparent drop of sensitivity in the short wave length of the spectrum is not due to the emulsion sensitivity characteristic in this region of the spectrum, but to the fact that the spectrographs are made through a wedge which absorbs the unrecorded short waves in a manner similar to that in which these waves are absorbed by the flint glass components of a photographic lens.

These data prove (*4) that a wide range of wave lengths within the visible spectrum is recorded.

Further references are available (*3) on the spectral distribution of energy of either white flame or panchromatic carbons.

This proves that in general practice, a wide range of wave lengths, approximately from 400 to 670 mu within the visible spectrum, is recorded on the film irrespective of the sources of illumination used; that is to say, normally (Wratten K) filtered daylight, incandescent filament lamps or arcs.

These premises established, it remains to analyze the characteristics of performance of the photographic lens with special reference to its ability to produce an image of an acceptable degree of sharpness.

It is well known that a photographic lens represents at its best, a compromise between its ability to form a point-by-point ideal image of the subject and its nearest approach, as determined by the optician, to answer the requirements of the specific use for which the lens is designed.

This involves carrying the correction of the various unavoidable aberrations to the best acceptable compromise.

The aberrations related to the scope of this article are obviously those which arise from the inability of a lens to bring to a common focus all of the wave lengths comprised in the spectrum which are generalized under the term "chromatic aberrations."

It is well known that for lenses of large aperture and designed for cinematographic purposes, only two of the spectral colors can be brought into coincidence at the image plane, resulting in unavoidable residual chromatic errors which the optician has called the secondary or residual spectrum (*5).

Focus in Cinematography

by

J. A. Dubray, A. S. C.

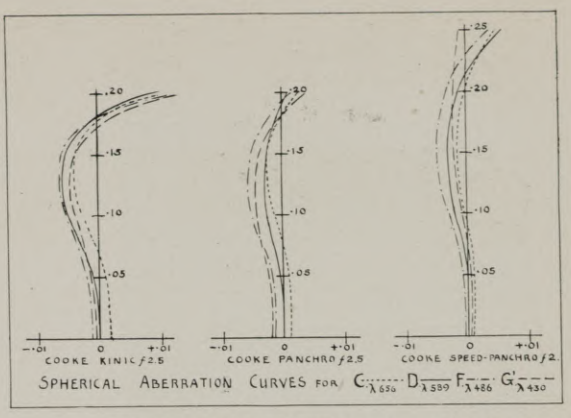


Fig. 2. Spherical aberration curves for the lines C, D, F, G' in Cooke lenses.

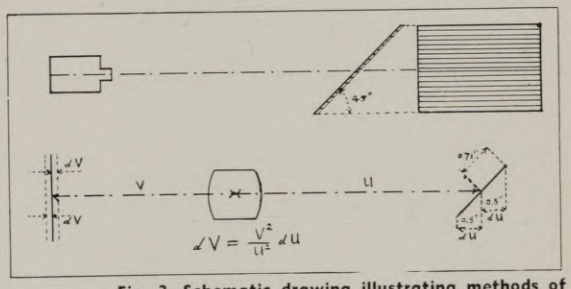


Fig. 3. Schematic drawing illustrating methods of testing for focal differences.

These limitations have led the optician to design instruments most adapted to the particular use for which they are created and to seek the best possible compromise imposed upon him.

For example, in refracting telescopes to be used for visual observation the colors brought to coincide with the focal plane would be those corresponding to the C and F lines, for which region of the spectrum the eye has the greatest visual response.

The narrowness of this spectral band is imposed by the great focal length of this type of objectives since the errors due to the secondary spectrum increase with the focal length of the lens.

A refracting telescope to be used for photographic purposes and with emulsions most sensitive to the blue region of the spectrum would be "corrected" for the F and G' lines, and since it would be impossible to accurately focus visually, the best focal distance would be determined experimentally and the lens locked in position for operating.

It is evident that since photographic lenses, and especially cinematographic lenses, are of a short focal length the magnitudes of the chromatic errors are reduced as compared with those of telescopic objective and therefore the two points of focal coincidence can be extended to a greater range of the spectrum.

Before the advent of red sensitive films a color correction for the blues and the yellows, that is to say for the D and G' lines, was found adequate, and a lens of this type could be focused visually and at the same time produce a photographic image of acceptable sharpness.

When panchromatic films made their appearance and with them the possibility of securing a "color rendition" more true to the visual impression, the use of filters and incandescent filament lights assumed, quite naturally, a much greater significance.

It was suggested at that time (*6) that it might be advisable to secure focal coincidence for the blue and the red regions of the spectrum.

Opticians responded to the suggestion and attacked the arduous problems involved in securing coincidence of focus for the C and G' lines and at the same time reducing to a minimum the secondary spectrum errors.

The difficulties of the task cannot be minimized, especially considering that the demand of the Cinematographer is for lenses of great aperture in which the paraxial secondary spectrum is modified by spherical aberration which is different for different colors.

In Figure 2 are shown the calculated spherical aberration curves for the C, D, F and G' lines for a Cooke Kinic f2.5 of pre-panchromatic days and for comparison the remarkable improvement secured for the same curves in the newest Cooke Panchro and Speed Panchro lenses working at the maximum apertures respectively of f2.5 and f.2.

It is to be noted that these curves are determined for the lens working at full aperture and show the remaining errors for all zones and not only for the paraxial rays, and that the uncertainty of focus due to the lens is well within the uncertainties which are possibly due to the dimensional tolerances of the camera used and those due to the human equation or difference in determining the location of the focal plane by various individuals.

In the course of actual practice it has been discovered that quite often focus differences have been imputed to "chemical focus" while their causes were to be found elsewhere.

In the vast majority of lenses the inner zones are under-corrected and the outer zones are over-corrected; that is to say, the former are focused short while the latter are focused long. If a lens of an aperture of, say f2 having this kind of spherical correction is focused at full aperture and then stopped down ever so slightly, the best focus is shortened at times to an appreciable extent and this effect is more apparent the longer the focal length of the lens.

It has also been found that consideration must be given to a possible buckling of the film at the camera aperture. Cameras are designed and constructed to secure the positioning of the film at the focal plane within extremely close tolerances but the film itself has generally a tendency to curl, at times to a sufficient extent to produce a relatively considerable displacement from the focal plane.

The foregoing leads naturally to the conclusion that due to the smallness of the errors involved, it is possible and

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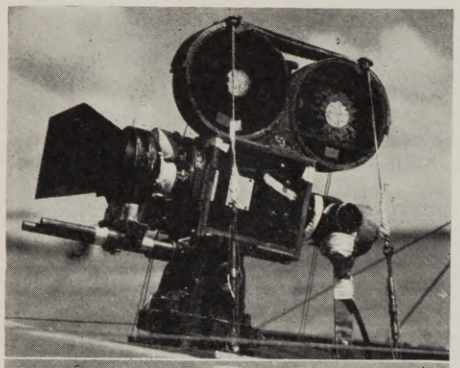


Fig. 1



Fig. 2



Fig. 3

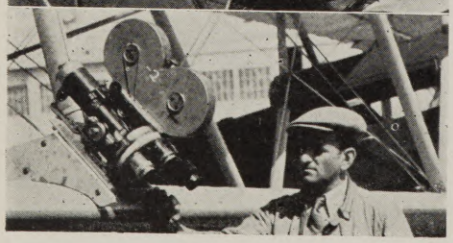


Fig. 4

Mounting

ALL camera-mounts for aerial cinematography can be divided into two classes: "Free Mounts," in which the camera can be directly manipulated by the cinematographer; and "Fixed Mounts," in which the camera is rigidly mounted, aimed by maneuvering the entire airplane, and operated by remote control. With the former, all "following shots," in which the camera follows the action of another nearby plane in the air, and most types of background shots for use in composite cinematography, are made; with the latter, all shots showing parts of the camera-ship itself (usually with the pilot "doubling" for an actor), and certain background and atmospheric shots at angles unobtainable with most free mounts.

Regardless of the type of camera-mount used, one paramount consideration prevails: it is essential that the camera be securely anchored, so that neither vibration nor wind-pressure may harm the picture. In the majority of modern airplanes, engine-vibration is a negligible factor; but except in the rare instances when we are able to use a closed-cabin ship, the pressure of the wind is a very important factor. In the majority of instances, not only do we have to contend with the pressure of the plane's movement through the air at a speed ranging from 70 to more than 300 miles per hour, but with the blast from the propeller—the "slip stream"—which greatly increases the problem. Accordingly, not only must the camera be rigidly mounted, but all unnecessary accessories must be dispensed with, and those remaining must be fastened securely with tape or wires, so that they can neither vibrate nor blow away. For the same reason, in fixed mounts, it is always a wise precaution to tie down the magazines, motor, and such projecting accessories, with wires, tightened with taped turnbuckles.

In the early days of aerial cinematography, the cameras were mounted in the 'plane by the simple expedient of lashing th tripod — folded, of course — to some convenient part of the ship's structure. This, however, suffers from several disadvantages: in the first place, the tripod takes up too much valuable room in the cockpit, and adds unnecessarily to the weight carried; secondly, such an installation is more difficult to fasten securely, and is usually more or less inconvenient to operate. The next step, of course, was to attach the tripod-head in place of a machine-gun on a regular Scarff machine-gun mount in military ships. This was more convenient, but unfortunately, the average machine-gun mount allows quite a bit of play—often as much as ¼"; and although this is desirable in gunnery, it is highly undesirable in camerawork. Accordingly, the present practice of making special camera-mounts grew.

As a general rule, each mount must be designed and built specially, to suit the individual needs of the work in hand. One general principle applies to all designs: to insure the utmost in rigidity, the mount must be anchored firmly to the actual structure of the airplane itself—in some instances, to the fuselage longerons; in others, to the wing-spars. Welded steel tubing is the most satisfactory material for making these mounts, though at times, wooden construction has served adequately.

One of the more simple mountings is shown in Fig. 1. This is a fixed-type mount, used in making "West Point of the Air." As will be seen, this mount was located at the tail of the plane, just forward of the empennage. The mount consists of a flat metal plate, slightly wider than the fuselage, laid upon a sheet of sponge-rubber, which serves as protection to the covering-fabric of the ship, and as a vibration-damper. The plate is rigidly fastened to the upper longerons of the plane by four U-bolts. On the plate is a metal spider, threaded to fit the standard tripod-

Cameras for Aerial Cinematography

by
Charles A. Marshall, A. S. C.

head which supports the camera itself. The camera is trained by the usual adjustments of the tripod-head pan and tilt movements, and is then tied down rigidly by wire braces running from the base-plate to a special brace fitted on top of the magazines. A standard Bell and Howell Cinemotor is used to drive the camera: note how it was secured from vibration by sturdy strap-iron braces. Note, too, how the matte-box lock-screws, the focusing-prism lever, and all joints or fittings that might be moved by the wind, are secured with adhesive tape.

Fig. 2 shows the same mount, remodeled to permit a higher camera-position. This was done by adding a four-legged platform of steel tubing between the base-plate and the spider carrying the tripod-head.

Fig. 3 shows a simple fixed mount on the upper wing of an Army Advanced Training plane. This mount is made of flat steel and duralumin strips, curved to fit the curve of the wing, and passing entirely around the wing. In addition, the mount is secured by large U-bolts fitted around the wing-beams. The camera itself is mounted upon the same base-plate shown in Fig. 1, and insulated and tied down in the same way. In this mount, however, the camera is mounted directly upon the base-plate. It is interesting to note that this mount, while reduced to the utmost simplicity, so disturbed the smooth flow of air over the wing that it desroyed the lift of two-thirds of the upper wing.

A somewhat similar type of fixed wing-mount is shown in Fig. 4. This mount was used several years ago in making background and atmospheric shots from a large commercial plane. The same type of base-plate was employed, and bolted onto a wooden framework, curved underneath to fit the wing, and bevelled on top, to give the camera the proper inclination. This frame was, of course, secured by U-bolts fitting around the main wing-beams. A similar wooden wing-mount is shown in Fig. 5: this was used for shots made straight back from the plane.

Two of the most unusual fixed mounts I have ever used were those used for making shots with the camera beneath the plane, in "Hell Divers" and, more recently, in "West Point of the Air." The latter is shown in Fig. 6. As can readily be seen, the camera is mounted on a flat base-plate, which is suspended by four sturdy steel tubes, which are attached to the lower longerons of the plane's fuselage. These tubes are fitted to the longerons by collars, locked with bolts: in this way, the camera's position and inclination may be shifted for alignment. The mount used in "Hell Divers" was similar, but, as it was located at the tail of the plane, just forward of the tail-wheel, it was naturally smaller. The shots for which this mount was made were, it will be remembered, those showing the plane landing on the aircraft-carrier "Saratoga": they began with the plane well in the air, and continued through the approach and the landing. In order to protect

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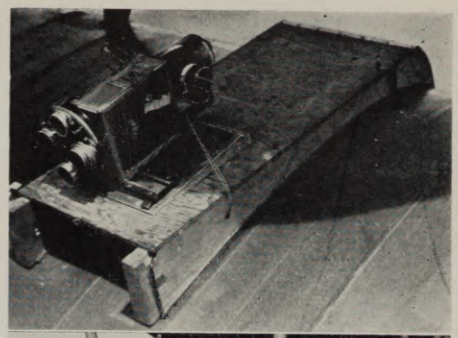


Fig. 6

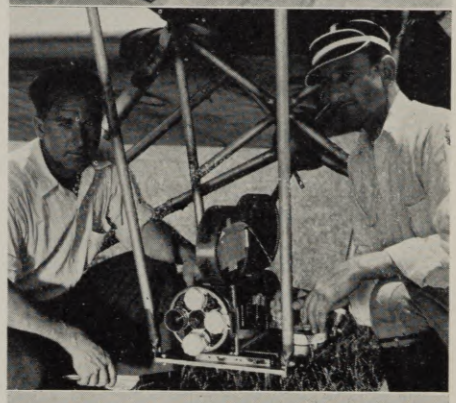


Fig. 7

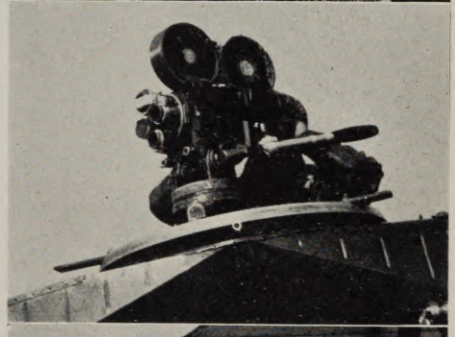


Fig. 8



Fig. 5



Fig. 9



RIDDLE ME THIS

The Riddle: What do you think of the idea of using single-film system sound for studio production—i.e., recording the sound in the camera, on the same negative as the picture?

JOHN STUMAR, A.S.C.: It might work out satisfactorily—but I doubt it. Recording both sound and picture on one film, it is inevitable that either sound or picture must suffer, for their photographic requirements are basically opposed. We all remember how badly photography suffered when we first started recording sound on film; and this is likely to repeat itself if we have to record and photograph on the same negative.

MACK STENGLER, A.S.C.: When sound came in, it set photography back at least eight years—and that with the advantage of the double-film principle. We have successfully overcome that setback, but a change to the single-film system would undoubtedly have the same effect — unless there is some radical and unexpected change in methods and equipment.

CHARLES ROSHER, A.S.C.: Of course we'd survive such a change—but we would have some pretty horrible problems in the laboratory before we got back to our present standard of picture and sound quality. Of course there would be a certain economy in the matter of film saved, but I think that this would be largely offset by the added difficulties in scoring, re-recording and "dubbing." Even aside from the scoring, all of our productions today are re-recorded in part, and often completely re-recorded: going to single-system recording would complicate this enormously, as well as making it difficult to cut closely.

HENRY T. SHARP, A.S.C.: I don't like it; when I made "Around the World in 80 Minutes," with Douglas Fairbanks, I used a single-system recorder, and the experience proved to me that either sound or picture had to suffer. In my case, I found that I had to expose so as to get a weak picture-negative if I was to get a vigorous sound-track, and accordingly the picture suffered to a greater or less extent, depending, of course, upon the light conditions under which I made the scenes. I realize that in the four years since I made that picture, many improvements have been made in both sound-equipment and sound-technique — but not enough, I think, to make single-film sound satisfactory for production use.

RAY WILKINSON, Paramount Studio Laboratory: At the best, it would be a compromise between sound-quality and picture-quality, with both falling below the standards we are now used to. Cinematography requires one definite type of emulsion and processing, while recording requires an entirely different film and treatment, and in many instances what is definitely an advantage to one would be a disadvantage to the other. It is difficult to see how a really satisfactory compromise could be arrived at with existing materials.

A. L. GILKS, A.S.C.: Theoretically, it would be possible to reach a perfect compromise between the requirements of sound and picture, so that neither should suffer overmuch. In practice, I doubt if it would be possible, as too many variable factors are involved. Moreover, even if this theoretically ideal compromise could be maintained consistently, it is questionable whether it might not be too delicate a matter to be commercially practical.

CHARLES STUMAR, A.S.C.: Naturally, unless unsuspected improvements have been made in recording and laboratory technique, either the sound of the picture must suffer. Probably both would, in practice. But I think that the worst objection would be the added troubles in re-recording and cutting. Today, we will often use the same sound-track under a number of scenes—and virtually all our pictures are extensively re-recorded. This would be almost impossible with single-film sound, while cutting would be much cruder, and give a less finished result.

L. GUY WILKY, A.S.C.: I think the answer can be found in any newsreel: most of these are single-film sound, and of rather poor quality, as a rule. If the picture is of the pleasingly soft quality we work toward in production camerawork, the sound is "mushy" and weak; if the sound is satisfactorily vigorous, the picture is generally too contrasty. This would be about the same if we tried production recording with the single-film system, for our aim in photography is a soft, delicate negative, while the recordist aims at a vigorous, contrasty negative for his sound-track. At present, these are satisfactorily achieved by using a soft-working emulsion for the picture-negative, and a fine-grain, high-contrast positive emulsion for the sound-track. I don't see how we could satisfy these conflicting requirements using single-film recording.

J. E. TUCKER, Asst. Superintendent, MGM Studio Laboratory: That's really a sound department problem! However, if such a change were ever made, I am confident that this laboratory could handle it satisfactorily. There are definitely established standards of quality and negative characteristics, to which we must adhere in our treatment of the picture-negative: and I am confident that our sound staff could, with only minor changes in their procedure, adapt their technique to these requirements without noticeable difficulty or loss of sound quality. It is largely a matter of balancing the sound and picture exposures so that each gets its desired effect with a single negative material and a single development.

TED TETZLAFF, A.S.C.: Of course there would be some small economy in using one length of film, rather than two; but I think this would be more than offset by the inconveniences to everyone concerned. Moreover, we are now trying to reduce the bulk of our camera-equipment, and to simplify it as far as possible: adding recording-units to the cameras would add both bulk and complication.

PAUL E. EAGLER, A.S.C.: Not so hot. I haven't had experience with single-film sound, but I've had a good deal of experience cutting pictures in the composite-print stage —and it's a terrible job. If sound and picture were on the same negative, you would have too much trouble cutting closely, handling overlaps, and the like. And of course there would be trouble in the laboratory, reconciling the requirements of sound-track and picture..

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A New Deal for the Newsreel Cinematographer

by
Joseph Hubbell
West-Coast Editor, Hearst Metrotone News



The new Akeley-Western Electric News equipment in action. The recording-unit is just above Cinematographer Greenwald's hand, under the finder-tube. Note small amplifier-case, lower left: this and a similar battery-case comprise all sound and power equipment and adds only 88 pounds to weight of camera outfit.

SOUND, for its own sake, is no longer news; accordingly, newsreel cinematographers must return to their old vocation of gathering NEWS in pictured form. This calls for a new deal in sound-newsreel equipment: no longer may newsmen be hampered by bulky equipment, nor chained to a two-ton "sound truck." Wherever possible, of course, news stories will still be "covered" in sound—and it must be good sound—but the new-day newsreel will stress news-value, and genuine motion picture reporting.

The Hearst Metrotone News is fortunate at this moment in being able to start virtually from scratch in this new-day camera-reporting. Reorganizing from a long and close association with the Fox Movietone Newsreel organization, it is able to commence operation with only the newest and most adaptable of newsreel equipment and methods.

From the start, it is recognized that there must be two basic types of equipment: lightweight sound-cameras and recorders, for use on all stories where sound is possible and desirable; and silent equipment for use in the many instances where sound-recording may be unessential or impractical. In both instances, lightness, compactness, and durability must be the governing factors.

Our sound equipment is, we believe, the last word in news outfits. The camera is the Akeley audio-camera, and the recording unit the Type "G" Western Electric portable recorder. The total operating weight of the outfit is only 182 lbs., and it is almost as portable as a silent-camera outfit. For field use, the equipment consists of the camera and its tripod, the microphone on a light tripod, the amplifier-case, a small battery-case, and the cables which connect these units. The entire outfit is light enough and portable enough so that only two men—the cinematographer and the recordist—can carry it anywhere, and operate independent of any truck or any power or other units save what they carry.

The camera, while not immediately recognizable as an Akeley camera, nevertheless retains most of the features which made the original Akeley design the premier news-camera of the world. The familiar round box is replaced by a square metal case, surmounted by external, 1000-ft. magazines very like those used in studio cameras. The curtain-type shutter has been replaced by a rotating-disc type, which, however, still retains the invaluable 230° aperture, and which is, of course, adjustable. The Akeley matched-lens system is maintained, with standard Akeley lens-mounts; but the lens-boards are slid into a revolving turret, so that any two lens-sets may be used, and interchanged by revolving the turret. The finder-action is still through a matched viewing-lens, though the image is reflected to an eyepiece located more conveniently at the left-hand side of the camera. The camera is driven by a battery-powered, direct-current motor, located on the right side, and the action is damped by a heavy, semi-enclosed flywheel. The latest type Akeley Gyro-tripod is used; it is essentially the same as the type always used with Akeley cameras, but modified to take the newer camera.

Sound-recording is through the newest Western Electric portable channel, using the single-film system. Although not literally of the "Wide Range" type, it has virtually all the characteristics of the "Wide Range" recording, with a frequency-range from 50 to 9000 cycles. It will record speech and sound-effects with fidelity equalling the best of studio equipment, yet the entire sound quipment packs into two small cases, and weighs less than the camera-outfit.

The microphone is of the moving-coil type, and is normally mounted on a small tripod; for special purposes, where the recordist may wish to make running announcements, the microphone may be attached directly to the amplifier. This type of microphone has the advantage for news recording in that it is small, and—unlike con-

Continued on Page 261



PHOTOGRAPHY of the MONTH

"THE DUDE RANGER" (Fox)

Frank B. Good, A.S.C.: Directing Cinematographer

Hollywood Reporter (September 12, 1934): "Like nearly all westerns it has some striking photography, in this case the photographer having picked up backgrounds of compelling beauty in the Arizona canyon and Painted Desert country."

Daily Variety (September 12, 1934): "Photography is gorgeous—."

Motion Picture Daily (September 14, 1934): "Frank Good's photography is excellent."

"SECRET OF THE CHATEAU" (Universal)

Robert Plank, A.S.C.: Directing Cinematographer

Hollywood Reporter (September 6, 1934): "Robert Plank contributes photography that shines by comparison with the rest of the production."

Daily Variety (September 6, 1934): "Photography is okay."

"THE TRAIL BEYOND" (Lone Star)

Archie Stout, A.S.C.: Directing Cinematographer

Hollywood Reporter (September 6, 1934): "—the photography is very good."

Daily Variety (September 6, 1934): "Archie Stout turned in a fine job of camera work."

"THE PURSUIT OF HAPPINESS" (Paramount)

Karl Struss, A.S.C.: Directing Cinematographer

Motion Picture Daily (September 8, 1934): "Karl Struss' photography is good."

"CRIMSON ROMANCE" (Mascot)

Ernest Miller, A.S.C.: Directing Cinematographer

Motion Picture Daily (September 8, 1934): "—and Ernest Miller's excellent photography—."

"GIFT OF GAB" (Universal)

Harold Wenstrom, A.S.C.: Directing Cinematographer

Daily Variety (September 8, 1934): "Photography is swell."

Hollywood Reporter (September 8, 1934): "George Robinson photographed more than well."

"THE CASE OF THE HOWLING DOG" (Warner Bros.)

William Rees, A.S.C.: Directing Cinematographer

The Hollywood Reporter (August 22, 1934): "—and the photography by William Rees is good."

Daily Variety (August 22, 1934): "Best work in the production goes to the photographer, William Rees."

Motion Picture Daily (August 27, 1934): "William Rees' photography is good."

"LOST LADY" (Warner Bros.)

Sid Hickox, A.S.C.: Directing Cinematographer

Motion Picture Daily (August 27, 1934): "The photography by Sid Hickox is good."

"CARAVAN" (Fox)

Ernest Palmer, A.S.C.: Theodor Sparkuhl, A.S.C.: Directing Cinematographers

Motion Picture Daily (August 27, 1934): "The artistic photography of Ernest Palmer and Theodor Sparkuhl benefits the production greatly."

"DEATH ON THE DIAMOND" (M-G-M)

Milton Krasner, A.S.C.: Directing Cinematographer

Motion Picture Daily (August 27, 1934): "Milton Krasner's photography is good."

"THERE'S ALWAYS TOMORROW" (Universal)

Norbert Brodine, A.S.C.: Directing Cinematographer

Hollywood Reporter (August 22, 1934): "Norbert Brodine's photography is an asset."

"THAT'S GRATITUDE" (Foy-Columbia)

Henry Freulich, A.S.C.: Directing Cinematographer

Daily Variety (August 22, 1934): "Photography is flawless."

"RICHEST GIRL IN THE WORLD" (Radio)

Nick Musuraca, A.S.C.: Directing Cinematographer

The Hollywood Reporter (August 25, 1934): "But the photography is something else again. Musuraca has done a magnificent job—."

Daily Variety (August 25, 1934): "Nick Musuraca has gotten everything into his camera work."

Motion Picture Daily (August 27, 1934): "Appointments are lavish, and the photography is in keeping with them."

Film Daily (September 8, 1934): Photography "Fine."

Continued on Page 256



One of Frank Good's set-ups for the "Dude Ranger." Lumber for this camera platform was hauled 128 miles.

Completely DEPENDABLE

THE dependability of Eastman Super-Sensitive Panchromatic Negative is not based entirely upon its well-known uniformity. It is the original, inherent quality of the emulsion...its constant ability to help producers and cameramen make the most of every picture...that *completes* its dependability...that seals the acceptance which this famous film enjoys. Eastman Kodak Company. (J. E. Brulatour, Inc., Distributors, New York, Chicago, Hollywood.)

EASTMAN *Super-Sensitive Panchromatic Negative*

PHOTOGRAPHY OF THE MONTH

Continued from Page 254

"AGE OF INNOCENCE" (Radio)

James Van Trees, A.S.C.: Directing Cinematographer

Hollywood Reporter (August 24, 1934): "Van Trees' photography is beautiful . . ."

Film Daily (September 1, 1934): Photography "Very Good."

"COUNT OF MONTE CRISTO" (United Artists)

Peverell J. Marley, A.S.C.: Directing Cinematographer

Film Daily (August 29, 1934): Photography "Fine."

Motion Picture Daily (August 29, 1934): "Camera work of Peverell Marley is uniformly good."

"A GIRL OF THE LIMBERLOST" (Monogram)

Ira Morgan, A.S.C.: Directing Cinematographer

Film Daily (August 29, 1934): Photography "Good."

Daily Variety (August 29, 1934): "Piece has been well photographed—."

Motion Picture Daily (August 29, 1934): "—Ira Morgan photographed with a skillful eye."

"YOUNG AND BEAUTIFUL" (Mascot)

John Stumar, A.S.C.: Directing Cinematographer

Film Daily (August 30, 1934): Photography "Good."

"THE PARTY'S OVER" (Columbia)

Benjamin Kline, A.S.C.: Directing Cinematographer

Film Daily (August 30, 1934): Photography "Good."

"PECK'S BAD BOY" (Principal)

Frank B. Good, A.S.C.: Directing Cinematographer

Film Daily (August 31, 1934): Photography "Excellent."

"WAKE UP AND DREAM" (Universal)

Charles Stumar, A.S.C.: Directing Cinematographer

Hollywood Reporter (September 1, 1934): "Charles Stumar's photography is standard."

Daily Variety (September 1, 1934): "—and photography is excellent."

Motion Picture Daily (September 4, 1934): "Charley Stumar photographed well."

"THE MERRY WIDOW" (M-G-M)

Oliver T. Marsh, A.S.C.: Directing Cinematographer

Daily Variety (September 1, 1934): "Photography keeps the glamorous quality high throughout."

Hollywood Reporter (September 1, 1934): "Oliver Marsh with his trusty camera has done a marvelous job."

"GIRL IN DANGER" (Columbia)

Benjamin Kline, A.S.C.: Directing Cinematographer

Motion Picture Daily (August 29, 1934): "Benjamin Kline's photography is good."

Film Daily (September 11, 1934): Photography "Good."

"WAGON WHEELS" (Paramount)

William Mellor, A.S.C.: Directing Cinematographer

Motion Picture Daily (September 5, 1934): "William Mellor's photography gives the picture distinction."

"REDHEAD" (Monogram)

Ira Morgan, A.S.C.: Directing Cinematographer

Daily Variety (September 15, 1934): "Photography is good."

"CHARLIE CHAN IN LONDON" (Fox)

L. W. O'Connell, A.S.C.: Directing Cinematographer

Daily Variety (September 15, 1934): "—and photography particularly good."

Film Daily (September 13, 1934): Photography "A-1."

"HAPPINESS AHEAD" (First National)

Tony Gaudio, A.S.C.: Directing Cinematographer

Daily Variety (September 14, 1934): "Photography, particularly that of Miss Hutchinson, is very good."

"DANGEROUS CORNER" (Radio)

J. Roy Hunt, A.S.C.: Directing Cinematographer

Hollywood Reporter (September 14, 1934): "J. Roy Hunt's photography is far above average."

CHEMICAL FOCUS IN CINEMATOGRAPHY

(Continued from Page 249)

quite easy for the cinematographer to determine a compromise of focusing position that will assure a definition at the focal plane well within the resolving power of both film emulsion and eye.

Since the advent of large-aperture lenses and panchromatic materials, it has been customary for the writer to determine the marking of the lens graduations through visual focusing, checked by photographic tests under incandescent filament lights and abide by the graduations so determined, instead of depending on visual focusing only. With highly corrected lenses this method of calibrating proved adequate for all sources of illumination commonly used, i.e., daylight (normally filtered or not), arc and incandescent filament lights.

It may be desired to determine quantitatively the focal differences due to the accumulation of the errors expressed above.

A simple and quite accurate method is to photograph a ruled chart set at a slanting plane at 45 degrees with respect to the axis of the lens.

Figure 3 shows schematically the setup.

The subject chart consists of a plane surface with a double line at the center and ruled with equi-distant lines. A distance between lines of 0.71" is usually adopted because they give (by trig) a horizontal displacement of 0.50" for each line.

The lens set at a definite distance (say 96" for a 2" lens) is visually focused for the double center line and then photographed with whatever illumination is desired. Suppose that the line next to the center ones shows under examination that it is sharper than the center lines, the formula

$$dV = \frac{V^2}{U^2}\, dU$$

dV—image displacement
V—focal length of lens
U—distance of object
dU—horizontal displacement of object
dU to be qualified with a plus or minus sign

gives the image displacement to determine the sign of dV; that is to say, plus dU would give minus dV since the object is receding and therefore the image draws closer to the lens.

Recently the question has been quite often raised as to the influence that the use of red filters would have on the focusing characteristic of the lens.

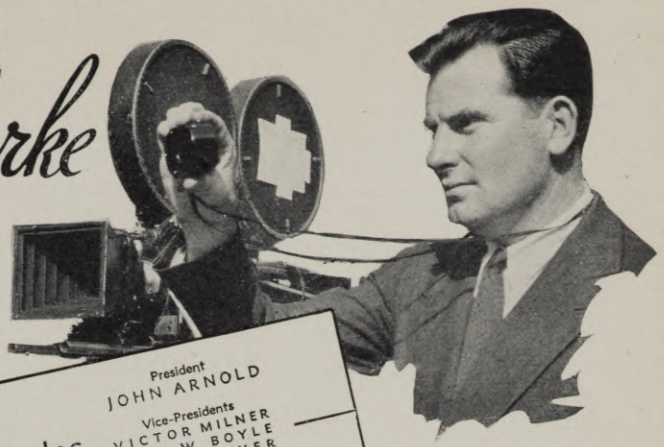
It is quite evident that if a red filter is used in conjunction with supersensitive film the focusing characteristics of the lens do not vary since the sensitivity of this type of film does not extend into the infra-red and its peak is in the neighborhood of 650 mu wave (C line).

For the use of infra-red film (E. K. Pan K or Dupont Infra D) and infra-red filters, since the peak of sensitivity is in the neighborhood of wave length 760 to 770, it appears that no appreciable trouble should be encountered when using a lens for which the C line of the spectrum is brought to coincide with the best focusing position, especially considering that this type of film is mostly used for special effects where absolute definition is more or less important.

However, for work where details are of importance it is deemed advisable to determine experimentally the best focus

Thank you! Mr. Clarke

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August 15, 1934

Weston Electrical Instrument Corporation,
598 Frelinghuysen Avenue,
Newark, New Jersey.

Gentlemen:

I have been using the Weston Exposure Meter since their introduction and have exposed approximately three million feet of motion picture film with them.

In filming "Tarzan And His Mate" many unusual photographic problems were presented, such as trucking from dense jungle to intensely bright open scenes, under water photography, and so forth, I found your meter an invaluable guide.

During the four months I was photographing the exterior scenes for "Viva Villa" in Mexico I used it constantly and under every conceivable light condition. Filter factors and exposures were accurately determined and my negative was surprisingly consistent. As a result of the "Viva Villa" work, I was assigned to the "Good Earth" production and have just returned from a seven months photographic expedition to China, where scenes for that production were made. Again under all unusual conditions the Weston was my guide.

In addition to the usual motion picture work I photographed about 5000 still pictures for research work consisting of interiors, time exposures, flash light exposures and, of course, all types of exteriors and upon many strange brands of film. It was also used to determine exposures for approximately 2400 feet of 16 mm. motion picture film. Probably my greatest appreciation of this instrument was in the calculation of Kodacolor exposures. Here was a photographic problem entirely strange to me, and the very high percentage of perfectly gorgeous results was due to your meter.

For use on my new picture "West Point Of The Air", starring Wallace Beery, I have just bought the newer model, and what a convenient, accurate beauty it is.

I believe all modern minded photographers will avail themselves of this scientific aid to perfectly expose the advanced grades of negative materials now offered.

In appreciation, I remain,

Very truly yours.
Chas. G. Clarke
Charles G. Clarke, ASC

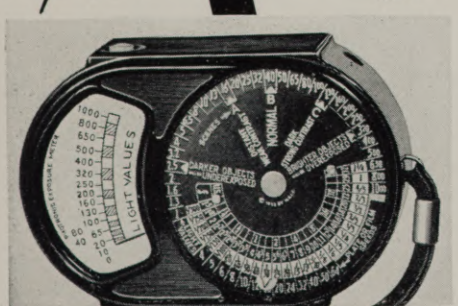
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position and calibrate the lens accordingly.

Infra-red photography has definitely entered the practical still-picture field but is still somewhat in the experimental stage in motion pictures. Those interested in this fascinating branch of photography are referred to a paper by H. W. Lee (Transaction Optical Society-28-1926-27-161-71) which was reprinted almost in its entirety in the December, 1933, issue of The American Cinematographer.

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MOUNTING CAMERAS FOR AERIAL CINEMATOGRAPHY

Continued from Page 251

the camera from the arresting-gear on the carrier, this mount had two metal bars, rather like runners, one on each side of the camera, and just out of the field of the lens, running curvingly down from the fuselage at a point about a yard in front of the camera, and sweeping sharply up immediately behind the camera. Their action was to brush the arresting-wires aside; otherwise, these wires would undoubtedly have ripped away the camera—and probably the tail of the ship, as well.

In all of these fixed types, the camera is lined-up on the ground, and is thereafter aimed by aiming the entire airplane. In this respect, military aircraft and military pilots are a great advantage, for the camera can be aligned with the machine-gun sight, and, as the Army or Navy pilot is trained in aiming his ship by use of this sight, it is easy for him to aim the camera in the same way. If the camera is mounted at an angle, or at the tip of a wing, the machine-gun sight can usually be adjusted so that the pilot can still sight the same way. In using commercial ships, one can often rig up a workable sight of the same pattern; and as the majority of our commercial pilots and especially the professional motion picture pilots, are Army or Navy trained, the same method can be used.

When making free-mount type camera installations on military airplanes, it is always excellent to make use of part, at least, of the regular machine-gun mount. Fig. 7 shows such an installation, using the base of a regulation Tourelle type gun-mount. Everything but the base has been removed, and the camera is supported from a large steel bar which is bolted across the Tourelle. As will be seen, the camera is mounted on a regular friction-type pan-and-tilt head, which in turn is supported on a cut-down "high-hat" bolted to the cross-bar. Fig. 8 shows a similar installation in a commercial ship. In this instance, the cover was removed from the mail-cockpit of the ship, and the supporting bars placed across, and bolted to the upper longerons.

In many commercial planes, however, the cockpits—especially the rear ones, which must generally be used for photography—are too small for such an installation, and the camera must accordingly be mounted outside the cockpit. Fig. 9 shows an installation of this type. In this instance, a small platform was built of welded steel tubing. The two legs nearest the plane were fitted into collars attached to U-bolts around the upper longeron, while the two outer legs tapered inward, and joining into a single tube, fitted a similar collar attached to the lower longeron. By virtue of this collar arrangement, considerable degree of vertical adjustment is possible. The camera itself is mounted on a regular friction-head (in this case, of the ball type), which is, in turn, mounted on the supporting mount by three short cast legs

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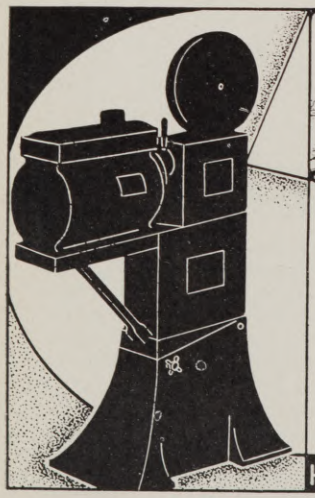
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which replace the regular tripod-legs. This illustration also shows two other types of fixed mounts: one on the upper wing, and the second atop the fuselage, just behind the motor. It will be seen that each of these is rigidly fastened to some part of the skeleton of the airplane.

One of the most unusual free-type mounts I have used was made for photographing the power-diving scenes for "Hell Divers." The film took its name form certain dive-bombing planes used by the Navy; their bombing attack is made by diving—almost vertically—upon the target from an altitude of 10,000 to 15,000 feet, with full power on, so that the planes build up to their "terminal velocity" of approximately 350 miles per hour. In this installation, not only did the terrific wind-pressure have to be considered, but some rather unusual questions of angles and perspective. We first tried the shot with the camera mounted conventionally, and the camera-ship diving with the formation. This proved unsuccessful, for camera-ship and formation kept their regular relative positions, and the only noticeable effect was that the horizon tilted over to about 70° from the vertical. There was no sense of diving in the picture. Therefore, we built a special mount, in which the camera, when the plane was in normal flight, lay at an angle of about 70° from the vertical, slanting backwards. When the ship nosed down into a 70° dive, the angle of the camera was such that the horizon was very nearly level, and the formation was definitely observed to be diving, as they appeared at right angles to the horizon.

In general, it is advisable to keep the camera as small, light and compact as is possible. Of available equipment, the Akeley camera is by far the best for this work, although the older, metal-bodied DeBrie Parvo models are also excellent.



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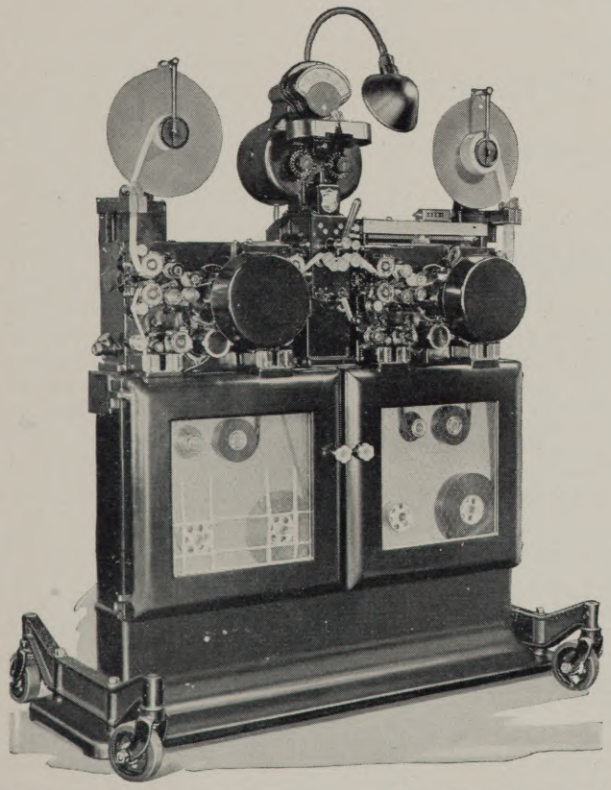
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Of production cameras, I prefer the Bell & Howell, due to its sturdy construction and general compactness. It is, of course, the best for making background shots, which must be especially steady. When using production-type cameras, it is wiser to use 400-ft. magazines, as they are smaller than the 1000-ft. type, and naturally offer less wind-resistance. Another difficulty with using the 1000-ft. type is that in aerial work we generally drive the camera with a lightweight cinemotor, which is not sufficiently powerful to ensure a proper take-up of more than about 500 feet of film, due to the increasing load on the take-up.

As a rule the lenses most used for this work are the 40mm, 50mm, 75mm and 4" and 6" telephotos. Occasionally, the wide angle of the 24mm lens is useful, and on rare occasions a more powerful tele-lens may be necessary. However, wherever possible, it is wise to avoid the use of long-focus lenses, as they usually project too far from the camera, and the air-pressure against such an unsupported projection tends to give vibration which may ruin the picture.

The ideal tripod-head for aerial use, regardless of the camera used upon it, is the Akeley gyro-head. The gyro-controlled movement is a great help in panning and tilting in the air, which is, at best, difficult, due to the resistance offered by the wind. Whether using an Akeley, or any other type of camera, the large, upright-image type Mitchell finder is the best, for, since you are wearing goggles, and working in a gale of wind, you cannot keep your eye close to a small finder such as that of the regular Akeley system.

In making wing-type fixed mounts, it is important to keep both camera and mount as small as possible, so as to effect the least possible disturbance in the air-flow past the wing. The mount shown in Fig. 3, as already mentioned, destroyed approximately two-thirds of the lift of the upper wing, throwing a corresponding overload on the lower wing and upon the motor. This was shown by the fact that, while the ship normally climbs to an altitude of 4500 feet in less than five minutes, with the camera in place it required more than twenty minutes to attain the same height.

It is always advisable to use a high-powered ship for a camera-plane, as, in addition to the considerable resistance caused by the camera, the extra weight of the camera, mount, and batteries is about equal to the weight of a good-sized man, and would dangerously overload an ordinary low-powered two-place craft. Bi-motored ships are very convenient, as the camera and its operator are usually out of the slip-stream, which makes for easier mounting and convenience of operation. Several times I have worked in the engine-nacelle machine-gun cockpits of "Condor" bombers: here, the field of vision is excellent, and the occupant is excellently protected from the slip-stream by the engine and its radiator. Closed-cabin commercial aircraft are excellent in that the cabin gives great freedom of operation; but the view is often too restricted, even if one removes a door, and places the camera there—which is a questionable procedure, at best, since the camera blocks the door, and would be dangerous in an emergency. In photographing from such a machine, the camera can be mounted very simply on a baby tripod, chained down to the floor.



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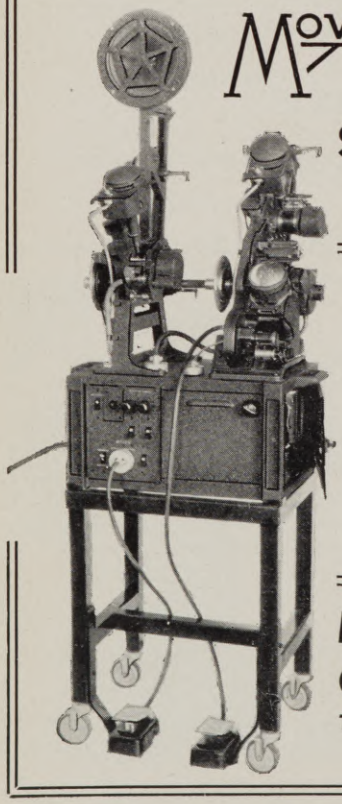
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Continued from Page 253

denser-type studio microphones—it requires no supplementary amplifier close by, but may be used at a considerable distance from the main amplifier.

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The actual recording unit is an amazingly compact light-valve system, which is semi-permanently attached to the camera. It uses a sturdy, permanent-magnet type of light-valve, with a curved sound-gate; the whole assembly is ruggedly built and quickly interchangeable. The light-valve itself is the same type used in several of the major studios, some of which have used these valves for over two years without need of adjustment or restringing. In point of both durability and sound-quality, we have found this valve superior to any type of glow-lamp.

The motor batteries provide sufficient power for over 12,000 feet of film without recharging, and the amplifier batteries will record nearly 20,000 feet of film before need for renewal. With a single spare set of batteries, a crew can remain in the field almost indefinitely.

The photographic and sound equipments each weigh 92¼ lbs. For field use, we carry 2", 4", 6" and 12" lenses; three 1000-ft. magazines; 250 feet of cable mounted on four reels; a spare light-valve and an extra recording-light. The question of transportation is, of course, vitally important: and although this equipment can actually be carried in the rear deck of any small coupe or roadster, we are equipping our staff with Ford V-8 sedans, which allow more satisfactory stowage and operation. The rear seat of the sedan is removed, giving ample room for all the equipment. Each case has its definite place, and each is firmly strapped down when in transit. The rear trunk of the car forms an excellent locker for spares, including the extra cable, one loaded magazine, etc. On the roof of the sedan is a special triangular framework upon which the camera tripod may be set up for running shots, or for shooting over a crowd; the tripod-legs are locked down with special clamps. When making such shots, the recordist can drive the car with his amplifier on the seat beside him, and monitor through the head-phones. The entire outfit is, we believe, the lightest and most satisfactory sound-news equipment in use.

For silent camerawork, we are using the familiar DeBrie "Parvo," in the metal-bodied model, and with several innovations of our own. This camera is undoubtedly the most compact, high-grade 400-ft. camera made, and has always been a favorite for newsreel work. We have equipped the camera so that it may be operated by hand or by motor, and always at the standard sound-speed of 24 frames per second. We are rather proud of the motor: it is a tiny, yet powerful, direct-current motor about three inches square and less than two inches

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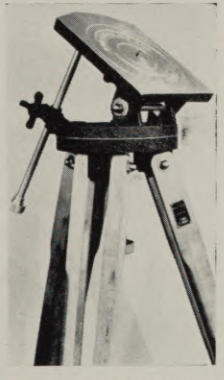
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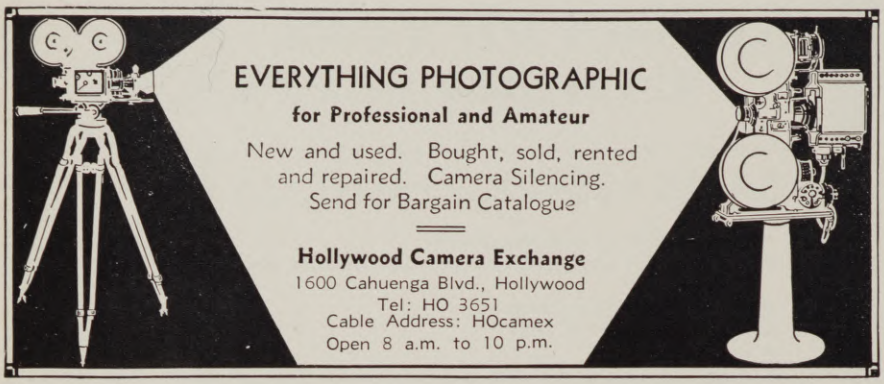
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thick; it weighs 3 lbs., 4 ozs., and can be quickly fitted to the camera in place of the usual carrying-handle. When the motor is used, the regular crank is removed from the camera, and a pulley substituted; then the motor and this pulley are belted together with a 10c rubber belt from one of our most popular vacuum-cleaners—in any almost any locality, a spare belt can quickly be obtained. The motor is driven by two 45-volt radio batteries, which are also easy to replace, and have a long life. The speed is controlled by a knob on the motor, and as the DeBrie has a built-in tachometer, it is easy to adjust it to the proper speed.

However, in many instances it will be impossible to use the motor-drive for these cameras; and to simplify the matter of cranking a consistent 24-frame speed by hand, we have devised a compact gear-box which fits over the regular crank-shaft of the camera, so that while the cinematographer turns his accustomed two turns per second, the camera is sped up to the proper sound-speed. This gear-box is about an inch and a half in diameter, and less than half an inch thick; it is held to the camera by three small screws, and takes the regular DeBrie crank.

With these two equipments, we are confident that our staff—over 70% of whom are old-time Hearst newsreel men—will be able to get back to the essentials of camera-reporting as they were before the novelty of sound chained us to cumbersome sound-trucks: getting the news—the real news—in pictures, but with the addition of the best in newsreel sound where sound is warranted. I foresee a real new deal and a new day for the newsreel: a return to the sort of newsreel reporting that made the old silent newsreels the most interesting spot on many a program, but coupled with technical advances which are already improving the standards of news-photography, and—most important of all—a wise and understanding use of sound, not as a novelty, nor as a shackle on the freedom of its operator, but in its rightful place, as a real help to news-presentation.





Riddle Me This

Continued from Page 252

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Let's Talk About Lenses . . . Chromatic Aberration

by

Wm. J. Grace

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IT IS BY no means necessary for the cinematographer to be able to make and mount his own lenses for him to do the best work, but at least it should be the desire of everyone who uses optical equipment of any kind to understand the possibilities and limitations of his lenses, for thru such knowledge it is not only possible to greatly simplify his efforts toward perfection but also to do things out of the beaten track.

There are many lenses available today, many as nearly perfect for the purpose for which you buy them as human mental and physical skill can produce them. There are also many lenses not so excellent, lenses which are listed as "bargains." With optical equipment as with other merchandise, the first cost by no means determines the economy which it affords.

Altho this series of discussions on the lens is not to be construed as a guide in the purchase of lens equipment, at least it is hoped that by talking over the characteristics of lenses my readers will somehow grasp certain principles and reasons for optical procedure.

Perhaps there is no other type of product on the market today which is so little understood as the lens. I refer to lenses of every description, whether photographic or not. Of the hundreds of thousands of photographers alone, probably not one in ten thousand knows the difference, say, between a lens suitable for portrait work and one suitable for scenic work. This is no doubt due to the mystery which has been woven around lenses and optics in general, but is more probably due to the dearth of easily comprehended texts on optics. There seem to be few volumes on optics which have been written as a mean between the complexities of corpuscular and wave theories of light and the simple high school texts.

But let's not worry too much about the lack of texts. As cinephotographers we are not so much concerned with the complicated theories underlying lens design as we are in why they are necessary and what they mean to our work. And, again, we are not so much interested in how glass is made, worked, and shaped as we are in the photographic effects we get with lenses.

If you don't demand too much of this author in the way of intricate calculations and three-page statements of complex theories, perhaps the two of us, you and I, can dig up some pertinent facts concerning our lenses.

Today, practically every lens we use with our cameras, large or small, still or cine, is composed of several pieces of glass, probably all ground to different shapes and most likely made of several different kinds of glass. Why? Is it just a base plot of Amalgamated Lens Makers to keep up the prices of their products? Hardly. In the first place, if that were the sole reason, someone would long ago have broken the traces and flooded the market with a simple, inexpensive system of lenses. The reason, dear reader, is that we ourselves have practically forced lens designers and makers to put out the multitude of lenses which are available today. We needed this kind of lens to correct this fault, we needed that kind of lens to correct another fault, sometimes we needed a lens to correct both faults at once plus a few more we found.

I say "we" advisedly, for it has been an indirect demand. We wanted to make this or that kind of picture, and because we created a market demand, camera manufacturers passed the buck on to the lens makers.

Ten or twelve years ago, color correction in lenses, as an example, was little discussed. The films we had then were colorblind so we didn't know lenses had to be corrected. Along came panchromatic stock which created a need for lenses which would at least make an attempt at focusing all colors in the same plane, because where the old film saw only a limited portion of the color range of nature and wouldn't record the rest of the colors anyway, the new panchromatic began to take notice of the lack of color correction of the lenses.

Without delving too deeply into the technicalities, let's accept the fact (which can be proven theoretically and experimentally) that different colors are of different wavelengths and therefore travel at slightly different speeds, so that red light (which has a longer wavelength than purple, at the other end of the visible spectrum) travels faster than purple light. No doubt you have yourself noticed a simple example of how the red lettering of a projected lantern slide seems closer to you than the blue or purple letters of the same slide.

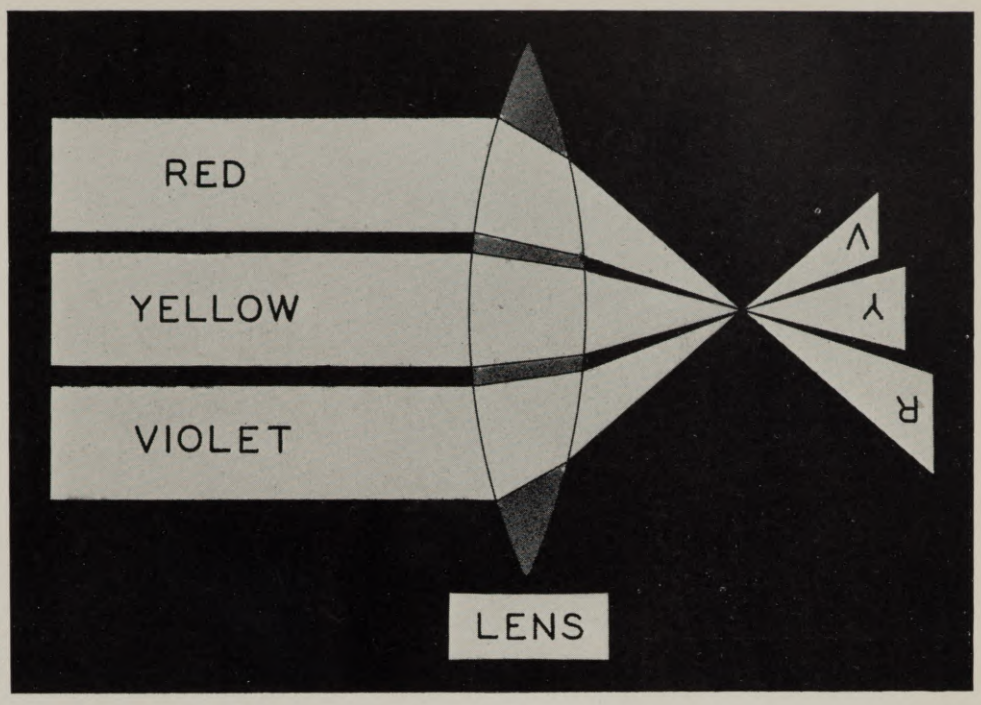
Now, red portions of an object will focus on a different plane than will the violet portions of the object, unless the lens is corrected for that phenomenon.

Errors in images formed by lenses are called aberrations [def.: (optics) deviation from the true focus]. Just now we are concerned with chromatic abberations, or deviations from true focus caused by light of different colors coming to focus at more than one single plane. Figure 1 shows how a lens which has not been achromatized (color corrected) would render red, green and violet test objects placed in a plane perpendicular to the lens. It is obvious that a single object of a color made up of red and violet pigments might be impossible to focus sharply.

If we were to turn the optical system of Figure 1 around end for end, it is easy to understand why the red letters of the lantern slide mentioned three paragraphs back seemed to stand out in front of the rest of the lettering.

Not only does chromatic aberration affect the focus of a photographic objective, but the picture is not true in its perspective. Red portions of the object would cause a larger or magnified image than would those portions which are violet-colored (or, for that matter, any other color of the spectrum, proportionately). Thus, it is important that a lens to be used in photographic work be achromatized, or color corrected in layman's terms.

The question has no doubt arisen in your mind, "If the red lettering of the lantern slide stood out in front of the rest of the lettering, why don't the reds in color motion picture work also stand out?" The answer is simple: Most



In a lens not corrected for chromatic aberration, the colors of the spectrum do not focus all in the same plane.

lantern slide lenses are not corrected for chromatic aberration, for they usually are designed for black-and-white slides. Most modern motion picture projection lenses are, however, achromatized.

It will become evident to you as we progress in our discussion of lenses that it would be almost impossible to grind lenses in such a shape that the important corrections are made in the grinding alone. A lens could be ground to make it free of one, or two, or perhaps even three different kinds of faults, but even if all faults could be corrected in the grinding, the cost would be prohibitive. Of late years, however, the very substance of lenses has been the subject of intensive study and laboratory work, with the result that lens designers have breathed sighs of relief that they have had more leeway in their work. Of course, the more numerous are the glasses offered designers, the greater the number of combinations and hence the more possibilities of getting too complex.

All glass is not alike, just as all steel is not alike. Perhaps you've noticed (or have you?) the growing number of steel alloys which are available. Anyway, layman that you may be as far as steel is concerned, you **have** noticed that the steel of the new high-speed trains is quite unlike its older brothers even in appearance. Steel used to be just a mixture of iron and carbon, but now it has molybdenum, chrome, tungsten, etc., and so on, **ad infinitum,** mixed with it to give it different characteristics.

So it has been with glass, There were formerly but two kinds of glass—crown and flint. About fifty years ago (which is a short time if we remember that relics of the ruins of Nineveh include a quartz lens, and some tablets inscribed with matter too fine to be read with the naked eye show that 6000 years ago optics were at least known) Abbe and Schott were given financial aid by the Prussian government and set up experimental laboratories at Jena, now one of the leading glass works of the world. They tried adding any number of different compounds to common glass to see what could be produced. Some of them did little to change the characteristics of common glass, and others made the glass too cloudy or too soft, but they did find certain combinations which gave results then desired. Naturally, the process is still incomplete, for some combinations are too hard to produce or are too unstable (yes, glass can change in shape or chemical structure), and the list constantly changes, adding new glasses, dropping old ones.

The Bausch and Lomb Co. lists at least two dozen different varieties of glass as stock merchandise, and others can be made up to special order. The same is true also of other glass works in other parts of the world. The more important glasses are ordinary crown, borosilicate crown, fluor crown, barium crown, ordinary flint, baryta flint, borate glass, and phosphate glass. Each can be supplied in several types.

But let's get back to chromatic aberration and how it is cured. It is known that every substance transparent enough to transmit light will bend the light rays according to its "index of refraction." Some will bend the light more than others. By combining several kinds of glass in a lens design, a lot of ills can be cured.

By using a certain type of glass for one of the elements of the lens and then neutralizing one of the faults of that lens by using in another element a glass which has a different index of refraction (refraction means bending or deflecting light rays), the different colors can be made to focus all on the same plane, without disturbing the other necessary conditions for a good lens.

The actual computation of lenses really has little interest to the average cinephotographer, for it is perhaps best that he forget about the mechanics of its construction, except for the knowledge of its capabilities, and concentrate on its intelligent use. Therefore, suppose we skip over the details of achromatism with the knowledge that if we buy a lens of a reputable make and design, this fault has been taken care of by men who are more expert than you or I might ever be at juggling indices of refraction and like quantities.

Next month we will discuss other characteristics of lenses, and from then continue to still more, until we have at least a working knowledge of that precision device—our lens.



Continuity With Simple Camera-Tricks

by

Arthur J. Campbell, A. S. C.

AMATEUR movie cameras always stop with the shutter closed—which makes the simple trick of interrupted motion very easy. If you put the camera on a tripod, stop it in the middle of a scene, and remove some person or object from the picture (everything else remaining in place) before continuing the action, on the screen you'll have the effect of the removed object suddenly vanishing. If you reverse the idea, and put the object in, instead of removing it, your audience will see it suddenly appear, apparently from nowhere. It is an interesting trick, even though it is simple enough to be done well by anyone, with any amateur camera. It is the basis of our story—
Main Title:

THE FAMILY MAGICIAN

Credit Title: Cast

Junior
His Mother
Jack, Joe, Bill His friends
The Skeptic
The Man with the Car.....

Scene 1. Long-shot on a street. Junior and his friends are returning from school: Junior wears glasses, and is a somewhat "bookish" appearing boy; his friends are typical boys. They walk down the street, straight into the camera.

Scene 2. Long-shot; reverse angle from Scene 1. The boys are walking down the street, away from the camera. In the distance a car is seen, parked.

Scene 3. Close-up of a tire-pump: a pair of hands is working the pump-handle up and down, going out of the picture at the top of stroke.

Scene 4. Long-shot of the car: it has a flat tire, and a man (back to the camera) is busily engaged pumping it up. Obviously, he is a book-salesman, for the car is full of books, and his coat, slung over the door, has its pockets filled with sales-books and papers.

Scene 5. Medium long-shot, from low set-up. In the foreground is the tire-pump, with the perspiring book-agent bending over it; in the background, the boys approach. They see the car and the man, laugh and come toward them.

Scene 6. Long-shot, as Scene 4. The man is still pumping, and the boys troop in and line up around him, backs to the camera. Some of them ape him, working imaginary pumps, etc.

Scene 7. Medium-shot: the man stands up and mops his brow with a handkerchief, then turns toward camera, noticing the boys.

Scene 8. Close-shot, panning from left to right, showing the boys, one by one, as they ape the man, pulling out handkerchiefs and wiping their foreheads, too. Junior alone doesn't follow suit, merely watching.

Scene 9. Close-up of the man. He smiles, and speaks to the boys:

TITLE: "Give me a hand . . . and I'll give you a book."

Scene 10. Medium long-shot of the boys. They indicate "nothing doing." Junior, however, nods, and steps forward.

Scene 11. Same as Scene 5, but with Junior pumping, while the boys sit on the curb and razz him. FADE OUT.

Scene 12. FADE IN. Close medium-shot of the man, sitting in the car; he hands a book to Junior, standing beside the car, and drives off. The boys gather around Junior.

Scene 13. Close-up of book: its title is "'How to be a Magician."

Scene 14. Close-shot of the boys' faces, crowding to look over Junior's shoulder. They all speak at once:
TITLE: "Let's have a show!"

Scene 14a. Cut back to a short flash of Scene 14, then FADE OUT.

Scene 15. FADE IN: Long-shot of interior of a room. The boys are getting ready for Junior's magic-show. They have just finished stringing up Mother's Spanish shawl for a back-drop; Joe and Jack bring in a small table. Junior, clad in an old frock-coat and top-hat (both much too big), and carrying a magician's wand, is supervising. WIPE TO:

Scene 16. Reverse-angle of Scene 15: all the neighborhood boys (and girls, too, if you wish) are crowding into the room and scattering themselves over the chairs, couch, and on the floor. Jack and Joe squat in the foreground, playing on mouth-organ and jew's-harp; Bill, in the background, stands taking "tickets" at the door.

Scene 17. Close-shot of Bill: on a table beside him is a jar or small goldfish-bowl, into which he drops the 2 pins admission of the children as they come in.

Scene 18. Close-up of the bowl, as the pins drop into it. It is quite full.

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Hints on Indoor Cinematography

by
Arthur J. Campbell, A. S. C.

BELIEVE it or not, the amateur cinematographer can use less light than the professional—and, if he knows his lighting, get equally satisfactory results. The effective speed of SuperSensitive reversal films is virtually identical with that of the films used by the professional: but the amateur has the decided advantage in the matter of equipment. For example, he has available lenses much faster than those generally used in the studio: most professional cameras are fitted with lenses working at f:2.7 to f:2.3, while amateur cameras frequently have lenses rated at f:1.9, f:1.5, or even f:1.3. The shutters of amateur cameras usually let in more light, too; for while the average studio camera has a shutter whose maximum opening is about 170°, the average amateur camera's shutter-opening exceeds 200°, and is in some instances as great as 216°. Therefore, where the professional cinematographer must use, say, a 1000-watt lamp, the amateur can do just as well with one of 500 watts, or a Photoflood.

On the other hand, the amateur is somewhat hampered as to the matter of space, for where the professional has a roomy studio stage in which to work, the amateur must shoot most of his interiors in his home where, however spacious the rooms may be for living purposes, space for camera, lights and such photographic necessities is decidedly at a premium.

Long-shots are the most difficult part of the interior problem. Close-ups and medium-shots can be made in almost any room, but long-shots require more lighting equipment, and the camera must be farther back from the subject, to include the desired field. So it is a good plan to study your house carefully beforehand, and select the rooms and angles best suited to making long-shots. Wide-angle lenses—especially the 15mm ones—are extremely useful, for they permit you to get a long-shot with the camera much closer to your subject than with the normal 1" lens. Also, it is often possible to place the camera in one room, and shoot through a doorway into the next room, getting a long-shot that would otherwise be impossible. All of these things must naturally be planned for before starting to shoot; similarly, it is wise to inspect the electric outlets in the rooms to be used, so that you will know just where to plug in each lamp. Extension-cables ending in a junction-box with two, four or more outlets are a great convenience, while with Photoflood equipment it is well to use an extension with a dimming attachment, so that by running the bulbs at low power while "lining up" your lighting, you may conserve the short useful life of these bulbs. If you are going to use a large number of lamps, it is also a good idea to arrange things so that, if possible, part of them will be on one of your house-circuits, and the rest on another, so you won't overload the house-wiring. Similarly, take a look at your fuses—for if your circuits are fused too low, you may blow out a fuse in the middle of a shot!

Another important thing to attend to in photographing indoors is the foundation under your tripod: there are a good many slippery floors in the average home, and if you don't look out, your tripod may slip and spoil an excellent shot. A little square of carpet that can be tacked down temporarily will prevent this, as will also a short, Y-shaped chain connecting the three legs of the tripod.

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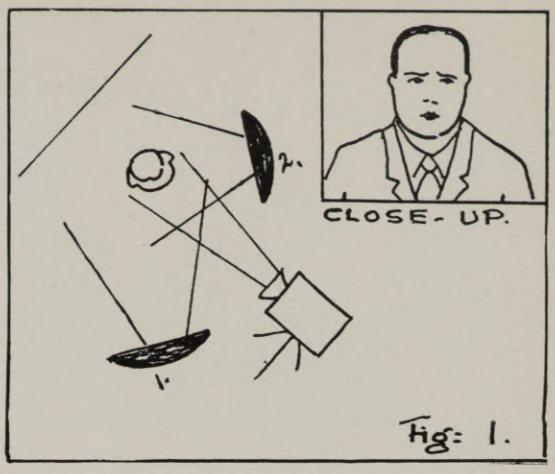


Fig: 1.

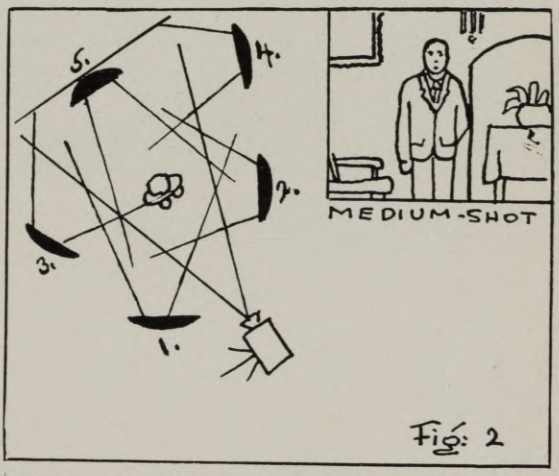


Fig: 2

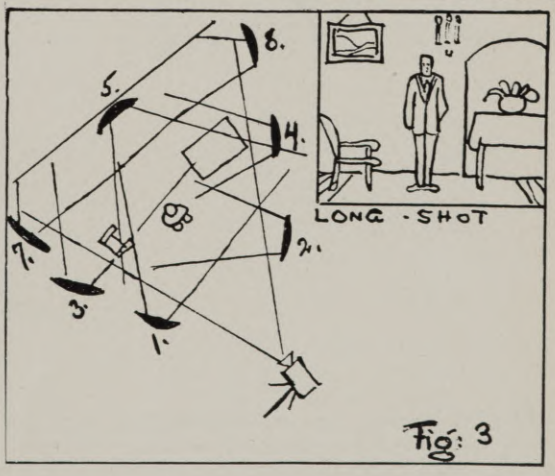


Fig: 3



How it's done: Mr. Brisson, matching his words to the lip-movements of the projected picture, sings into the "mike" of home-recording phonograph at left, making his own talkies.

Making Silent Movies Talk

by
Carl Brisson

A FEW months ago, my brother gave me a 16mm home-movie camera, and we began making a movie record of our experiences in America. It was lots of fun, and provided a wonderful souvenir of our stay in Hollywood; but one day a pessismistic friend tried to take the joy out of it by remarking, "Isn't it too bad, Carl, that you can't make these pictures in sound, and have a record of the voices of your friends, as well as their pictures?"

That made me wonder if perhaps I couldn't at least try to get some sound in my movies. Of course, sound-on-film recording was out of the question, since there are no really amateur recording outfits available, and I'm much too new a novice to build or use a special 16mm recorder. But how about sound-on-disc? I had a home-recording gramophone, an Eastman Cine-Kodak, and a Filmo projector: surely I ought to be able to combine these and get some passable sound pictures!

I tried it—and to my surprise I found it surprisingly easy to make acceptable amateur talkies. Goodness knows, my pictures aren't perfect—a studio sound-man would find plenty of flaws in my tone-quality and synchronization—but as a strictly amateur proposition, they are all right, and gave me lots of fun in the making. Here's how I do it:

First of all, I make my picture—silent. Let's say it is a picture of myself, talking and perhaps singing. I talk and sing exactly as though I were making a talking film, speaking the words I want to record, and making a careful note of all that is said.

Then the film is processed in the usual manner, and edited. When this is done, I project it a number of times, while I talk and sing, rehearsing until I can synchronize my words with the pictured lip-movements and action. Then I project the picture again, and talk and sing into the microphone of my home-recording phonograph, making a disc record of the sound part of the picture. If I've rehearsed properly, the sound will be pretty well synchronized with the picture.

When I want to show my little talkie, all that is necessary is to put the film in the projector and the record on the gramophone, and start them together: with a little practice, it is possible to start the two machines off so nearly in step that, even though they aren't connected in any way, the sound and picture are surprisingly well synchronized.

Of course, the ideal arrangement would be to use a 16mm sound-on-disc projector, such as the Animatophone or Filmophone, in which the record-turntable and the projector are mechanically connected. Then, if you mark a starting-frame on the leader of your film, and mark the starting-point of the record, you simply can't have any trouble with synchronization.

The greatest advantage of the whole idea is that you can make your picture anywhere, under any conditions, and since the sound-part is recorded later, at home, you don't have to worry about any unwanted noises which would surely trouble you if you made your recording at the same time you made the picture. And it is really surprising what you can do in the way of putting in sound-effects: one of my talkies, for instance, was made at the beach, and when we recorded the sound later, my brother and I had a lot of fun making surf-noises, and the like. There is also a lot of amusement in gathering together the people who appeared in your picture for a recording party, when you make the sound part of the picture, and climax the evening's entertainment by the premiere performance of your home-made talkie.

Making talkies this way isn't expensive, either. You can get the record-blanks at any music store: the little six-inch records are four for a quarter, and the larger, longer-playing 10-inch blanks are fifty cents apiece. The playing-time of these records, of course, depends upon the speed at which they are made and reproduced: most of the home-recording gramophones have two-speed turntables, allowing you to record at either the standard commercial-recording speed of 78 revolutions per minute, or at the standard talking-picture record-speed of 33-1/3 r.p.m. Naturally, the latter is more economical, as it gives about double the playing-time; the sound-quality of the higher speed is perhaps a bit better, but not enough so to offset the economy of the slower speed. Recording at 78 r.p.m., the small record gives a playing-time of about one minute, and the larger record plays about 3½ minutes; but at 33-1/3 r.p.m., the small record plays nearly two minutes, and the larger, 7 minutes. Reduced to terms of screen-time, the 10-inch record, at 78 r.p.m., will "sound" 100 feet of 16mm film, while at the slower "talkie" speed, the same record will provide sound for a 200-foot reel. If you take

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HERE'S HOW

by A. S. C. Members

PLEASE explain the term "hand test" as used in the article by George J. Lancaster, A.S.C., in your September issue; also, what are the "3N5" and "5N5" filters he refers to?

—I. L. M., Taft, Cal.

The term "Hand Test" refers to the practice, followed by all cinematographers when on location, of making short test-shots as a check on atmospheric conditions, filtering and exposures, and developing them on the spot—by hand, as distinguished from sending the film back to the studio laboratory. Apparatus used for this ranges from a simple changing-bag and a bottle of developer to miniature-camera developing outfits and specially-built "test boxes." The practice is suited only to negative film, and can hardly be recommended to amateurs.

The filters you ask about are two in which a light yellow color-filter and a neutral-density filter are combined into a single unit. The 3N5 is an Aero 1 color-filter combined with a .50 Neutral Density filter; the 5N5 combines an Aero 2 color-filter with a .50 Neutral Density. On SuperSensitive film their factors are, respectively, 4 and 5; on regular Pan, 5 and 8. They are useful for giving the nice correction of an Aero filter and at the same time toning down harsh contrasts, glaring areas, and the like.

—George J. Lancaster, A.S.C.

I AM planning to do my own reversal work, using a drum-and-tray system. Is it necessary to use a solid, opaque drum for this, or could I use a slatted or "squirrel-cage" type?

—W. M. W., Detroit, Mich.

An opaque drum is not an absolute necessity, though it is undoubtedly a good safeguard, as it would prevent the "flashing" light from passing through the film and overexposing or fogging the film on the opposite side of the drum, and also would reduce undesirable reflections from the film-base. However, for the type of work you will probably be doing, the solid drum is unnecessary; I have used the open drums myself, with very acceptable results. However, be sure and have enough slats in the drum to round its contour out well: otherwise you will get "rack flashes" at the points where the film bends sharply.

—Hollis F. Moise, A.S.C.

ARE there any prepared solutions available for tinting and toning reversal film (8mm or 16mm) to produce colored effects?

—J. F. L., Los Angeles, Cal.

Most of the solutions sold for toning or staining still photos, and especially lantern slides, will do excellently with reversal film. Probably the most easily obtained are the "Tabloid" toners and "Soloid" stains, which come in tablet form, and are very easy to use.

—Fred W. Gage, A.S.C.

I HAVE tried making pictures with my miniature camera and Infra-Red sensitive film, and I notice that green grass and foliage is rendered very light. Why is this—I had thought that green absorbed red light, rather than reflecting it?

—B. M., Jr., Hartford.

You are right in thinking that green absorbs red light—but the green coloring-matter (Chlorophyll) in foliage also reflects the invisible Infra-Red rays very strongly. Thus, using Infra-Red-sensitive film and a filter such as the Wratten 70 or 88, which exclude most of the visible rays but pass the invisible Infra-Red, the strong reflection of the Infra-Red from the chlorophyll-green foliage will naturally make the foliage photograph light.

—Elmer G. Dyer, A.S.C.

I HAVE read that Panchromatic film, used with filters, has great power to cut through haze, but recently I have tried Panchromatic film in my 16mm camera, using a 2x filter—and found very little benefit in haze-penetration. Why?

—E. H., Boise, Idaho.

Used with the proper filters, Panchromatic and SuperSensitive film are excellent for cutting through haze. These emulsions are more strongly sensitive to red, yellow and green light than is the older Orthochromatic; but they still retain some preference for blue light, which is the strongest component of most haze. Therefore, a filter must be used which will hold back enough of this blue light to allow the other rays from the distant subject to register on the film. What you have probably done is use a filter which does not do this sufficiently. Many filters marketed for amateur cameras were designed before the introduction of Panchromatic and SuperPan amateur films, and are really intended for use only on Ortho. Thus, a "2x" filter of this type would be only a questionable "1x" for Pan, and valueless for Super. For your purpose, I would recommend either a strong orange-yellow filter like the Wratten "G" (5x on Pan, 3x on Super) or a red filter such as the Wratten "23-A" (6x on Pan, 3x on Super). In extreme cases, an even heavier red filter might prove useful, as it would hold back even more of the blue rays, allowing the weaker but more desirable ones to do their work on the film.

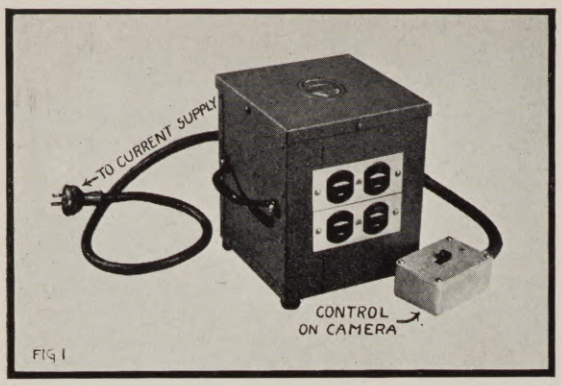
—Daniel B. Clark, A.S.C.

I HAVE a set of 500-watt photographic lights; if I want to use more lamps, or cover a larger area, will it be necessary for me to get the same type of lamps, or can I use Photofloods together with my present equipment?

—J. C., Brooklyn, N. Y.

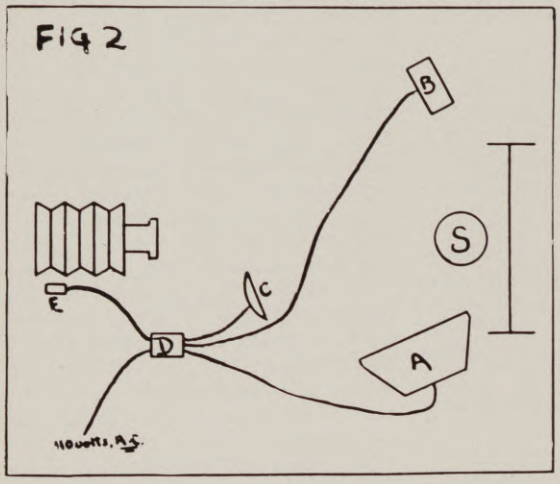
It is quite possible to use Photoflood lamps in conjunction with the older photographic 500-watt Mazda lamps. Granted that you use the Photoflood bulbs in equally efficient reflectors, you will find the light-output of the two types very similar, though the light from the Photoflood is usually, due to the frosted globe, slightly "softer" in quality. The only exception worth noting is in making Kodacolor interiors: in this, the chromatic difference between the whiter light of the Photoflood and the yellower light of the ordinary high-power Mazda is sometimes noticeable. The special "Photoflood" ratio diaphragm supplied for Kodacolor interiors corrects for this whiter light, whereas the yellower Mazda light often gives your picture a slightly reddish tone.

—Wm. Stull, A.S.C.



Control for Photofloods

by
Templeton W. Wood



Typical hook-up. A, 2 No. 4 Photofloods; B, 1 No. 1 Photoflood; C, 1 No. 1 Photoflood; D, Economy Coil; E, Remote Control Switch.

FROM the time photoflood lamps were first put on the market, manufacturers of lighting devices have recognized the necessity for dimming, when the lamps are not in photographic use, in order to conserve their life. A series-parallel switch is usually provided. This was adopted, not because it was a satisfactory way to solve the problem, but because it was the least expensive way.

Such a system of control has many disadvantages. When the lamps are in series, the light is so dim as to make it impossible to know in advance what the light balance will be at full "speed." When the operator is ready to make the exposure, he must make the rounds, and turn a switch on each light source. If a portrait sitting is being made, the sudden burst of light, as the lamps are thrown into "high," is very disconcerting to the subject, and may require a pause, so that the eyes may become accommodated to the new intensity. The lamps can be controlled only in pairs. If an odd number of lamps is used, the odd lamp cannot be controlled.

Since electricity is distributed in the United States, almost without exception, in the form of alternating current, the designer used the principle of the transformer as his starting point. This precludes the use of the device on direct current, but direct current supply is so exceptional that it need not be considered.

Having ascertained from the engineers of the lamp manufacturer that a small photoflood, operated at ninety volts, would have a life of from twelve to sixteen hours, this value was decided upon as the low "speed" of the coil, the high "speed," of course, being the line voltage of 112. There was another reason for this decision. Since the heart of the device is a specialized form of a transformer, called an auto-transformer, considerations of size, weight, and expense dictated that the low "speed" should be no lower than necessary to give the lamps a satisfactory life. The greater the difference between the primary and secondary voltages in an auto-transformer, the larger, heavier, and more expensive the device becomes.

The general appearance of the coil is shown in Figure 1. It is a cube of approximately seven inches, and it weighs about fifteen pounds. The steel case, finished in green enamel, contains the auto-transformer. At the back, the cable, marked "to current supply," is plugged into any baseboard outlet. This outlet should be fused according to the number of lamps used.

Each small photoflood takes approximately two amperes at 112 volts. The other cable, marked "control on camera," terminates in a snap switch, enclosed in an aluminum box. Each cable is ten feet long. In the face there are four standard receptacles into which the lighting fixtures are plugged. The coil will handle ten or more small photofloods. If the larger, No. 4, lamps are being used, or if a combination of the larger and smaller sizes is in operation, the device will handle them with equal efficiency, provided a total load of about 2500 watts is not exceeded. It is equally satisfactory for still or motion picture work.

Figure 2 explains the manner of use. The coil is placed on the floor at a convenient point, and the supply cable plugged into a baseboard outlet. The cable to which the switch is attached is brought to the back of the camera and hung on the tripod, or otherwise disposed of conveniently. The lighting units are plugged into the receptacles on the face of the case, and the switch on the tripod is thrown backward and forward to find the "low" speed. The lamps are allowed to remain in "low" during the period of set-up, focusing and adjusting, ample light being provided for the ready accomplishment of these functions. Just before making the exposure, the operator throws the switch on the tripod to "high," makes the exposure, then throws the switch back to "low" again. By following this procedure, a conservative estimate of the average life of the smaller photoflood is from eight to ten hours, and for the larger one, from forty to fifty hours.

The advantages of this method of control are now apparent. The most important, unattainable with the series-parallel system, is the ability to make the set-up and arrange the lighting with the assurance that the light balance will be the same at high "speed" as we see it at low "speed." Control being by voltage, alone, neither the number of lamps connected, nor their wattage, can have any

Continued on Page 281



TRICKS and GADGETS

Here we present the first winners of our new "Tricks and Gadgets" Contest. You'll agree, we hope, that they are mighty useful ideas for amateur filming, which any amateur can adapt to his requirements. We'll wager, too, that you have some ideas which are just as good—in fact, we're betting the prizes listed on inside back cover that you have! So send in your tricks and your gadgets; they may win you a prize.

A Professional-Type Finder

The finders usually supplied on 16mm and 8mm cameras (especially the earlier and less expensive models) don't correct for parallax: that is, they aren't accurate when the subject is close to the camera, so that in close-ups you'll often cut off part of a forehead, or leave out one side of your subject, according to the position of the finder. So I built a professional-type finder for my Cine-Kodak. It gives a nice, big image; and a simple wheel, rotating in a cam-like movement, corrects for parallax. It is easy to construct, and will work, not only with the Cine-Kodak, but with any box-type camera, 16mm or 8mm alike. I get a thrill out of using this finder in shooting my films, for it not only looks professional, but it really is professional equipment.

The body of the finder is a simple cardboard box, at least eight inches long, and covered with imitation leather. At one end the box is closed with a tin front (which may also be covered with the leather). In the center of this front is mounted a meniscus lens of 6-inch focal length; the lens from an old "Brownie" camera will do excellently for this. At the focal point of the lens—that is, a point six inches down the tube from the lens—is a ground-glass screen, mounted with liquid solder in the metal aperture of a 4½x6cm filmpack container. Just behind the ground-glass cut a small slot in the side of the box, to admit mattes to mask the finder when you use lenses of longer focal-lengths: these mattes may be made of heavy paper or celluloid, cut away to give the exact field of the desired lens. The box of the finder overhangs the ground-glass by about two inches, so as to shade it and give you an easily-visible image. It should be painted black inside.

One side of the tin front (the side nearest the camera) is extended, cut out, and curled to make the female part of a hinge. The other half of the hinge is an extension of another tin piece attached to the camera, as shown. A removable pin holds the finder on its hinge, and a piece of bent clock-spring prevents it from swinging out on its pivot.

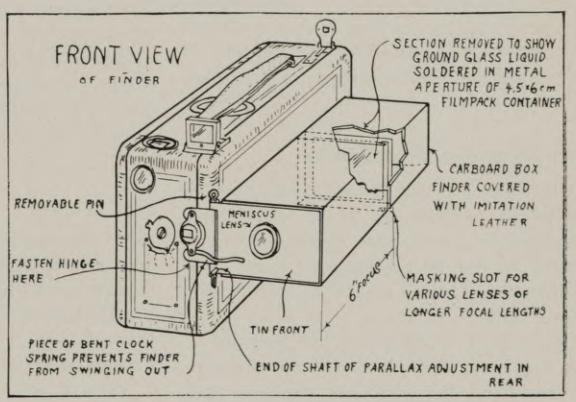
The parallax adjustment is provided by a shaft, running the whole length of the finder-box, with an eccentric wheel projecting at the rear. This wheel bears against the side of the camera under the pressure of the spring, and, as the shaft is set off center, turning the wheel will cause the finder to pivot: it is a relatively easy matter to calibrate the wheel so that the finder is accurate for any distance. In my own Cine-Kodak, for instance, the regular finder is directly above the lens, so there is no horizontal parallax: using this as a guide, with the auxiliary finder mounted beside the lens, it is easy to calibrate the finder-markings quite correctly. It is a good idea to paint the end of the wheel white, so you can mark the calibrations in pencil until you know they are accurate, after which you can engrave them in the metal.

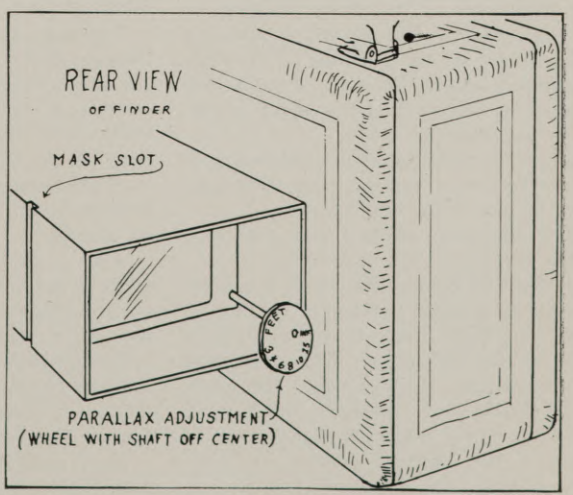
LOUIS A. INSERRA,
Omaha, Nebraska.

Title-Turntable

Sometimes it is necessary to have three separate Opening Titles in one's picture. Why not present these titles in a rotating fashion, as is done professionally? An old phonograph turntable will do the trick. Cut cardboard to the

Continued on Page 281







TREND of THE TIMES

A Super-Camera

● The largest camera in the world has just been put into use by the United States Coast and Geodetic Survey and is used for reproducing nautical charts and airway maps. The camera weighs fourteen tons and is thirty-one feet long. The photographer stands inside the camera in a specially built chamber. Two years were required to finish this large product.

Fast Color Film

● According to a news item in Camera, published in Switzerland, a fast color film is available in Europe manufactured by Agfa. This is termed the Agfacolor-Ultra Film. It is sold in ordinary film-packs or rolls for any size camera. No filter is said to be necessary and exposures are listed as ranging from a 10th of a second to a hundredth of a second.

This means instantaneous color photography.

Third Dimension Photography

● The French Photo-Revue publishes an interesting article on third dimension photography. The new principles described permit an amateur of even limited means to carry on a few interesting experiments.

One of the features of this process is that it gives all angles of the subject photographed the same as the eye sees it. The photograph when finished gives the impression of the object floating in the air, and by looking at it sideways you actually see the sideview of the photographed subject. In spite of some very convincing experiments the whole is still in an experimental stage.

Since the finished result is visible only by projection or transparency, this may open up new fields for research.

The following method was described in the making of the experiment:

A sheet of black paper which has been pierced by a great number of small pinholes is placed flush to an unexposed plate in the dark room. This is exposed to an ordinary electric bulb. The plate is developed and reversed. After it is dried the black paper is placed over it again in the identical position it occupied during the exposure process. A ground glass is placed on top of this lighted from behind. Looking through the holes you will see the photographed lamp apparently floating in space. From all sides the image will seem a perfect plastic image.

The black paper must be the same size as the plate. The pin holes must be about 15 per square inch. Holes to be kept exact distance from each other. Paper and plate to be placed between two ordinary photographic glass plates. Any printing frame will hold all of them together. Place electric bulb about 20 inches from the frame; expose about 4 minutes. Develop plate and make positive print on another plate. Replace black paper on positive plate. Place ground glass plate between light in a box and positive plate then stand away about 5 yards. At first you may not see anything. Move your head from side to side until you see the photographed lamp. Approach it slowly. Get as close as you can and look at it from all sides. The effect is startling. If you approach too close the image goes out of focus and then will disappear. Retreat and the image will appear again.

Fast Lenses

● At the recent Leipsig Fair in Germany the Photographic Section had several outstanding novelties to offer. The trend of Photographic progress is seemingly towards newer and faster lenses and higher speed emulsions.

Several new fast lenses are claimed to be just as sharp and have as great a depth of focus, wide open or shut down.

The Supracomar manufactured by the Plaubel Werke has a focal length of 4.5 cm with a speed of f1:2.

A world record is claimed by the Astro Works with their new Tachone at f0:85 destined for cinematographic cameras.

A great number of miniature cameras embodying all kinds of new features were on display.

Also a new Leica attachment which enables the operator to focus his image on a mattglass several times the size of the actual image photographed.

Considerable interest was aroused by the new Minifex miniature camera which takes a picture 13x18mm; Lens Astro-Tachar 5cm with a speed of f0:95.

Agfa exhibited samples of their new Fine-Grain emulsion "Finopan" which allows Leica enlargement without **grain** to a dimension of 30x40cm. This new Finopan is slightly less sensitive, corresponding to a speed of 20-21 degree Scheiner.

Automatic Loop Adjustment

● A U. S. Patent (No. 1,958,152) has been issued to Etienne Oehmichen, of France, for an invention described as "means for mechanical adjustment and automatic maintenance of film-loops during passage of film through cinematographic apparatus."

Another Cine Color

● According to foreign trade papers a new cine color process has been invented by Richard Gaschop and Carl Pokorny, chemists, called by them the Irix Color Photo. This process is said to be based on a negative gelatine relief which serves as a matrix for printing in 3 colors. Other details are not available, but it is difficult to imagine how a perfect contact and sharpness can be secured with this method.

New Studio Lamp

● A new rifle-type lamp is said to have been perfected in France by a manufacturer of Marine Lighthouse equipment. By the use of a new type reflector they claim to effect a 70% saving of amperage. For the present the lamps are only built to take 500-watt lamps. The new lamp is called the Hollophane.

Miniature Film Packs

● A German manufacturer of raw stock has devised a new and ingenious method of packing raw film for miniature cameras. It eliminates the measuring of film in the dark room when loading. This film comes in a light-tight package sufficient for 10 loadings. Each length is separated by an incision easily felt by the hand in the dark.

New Miniature Camera

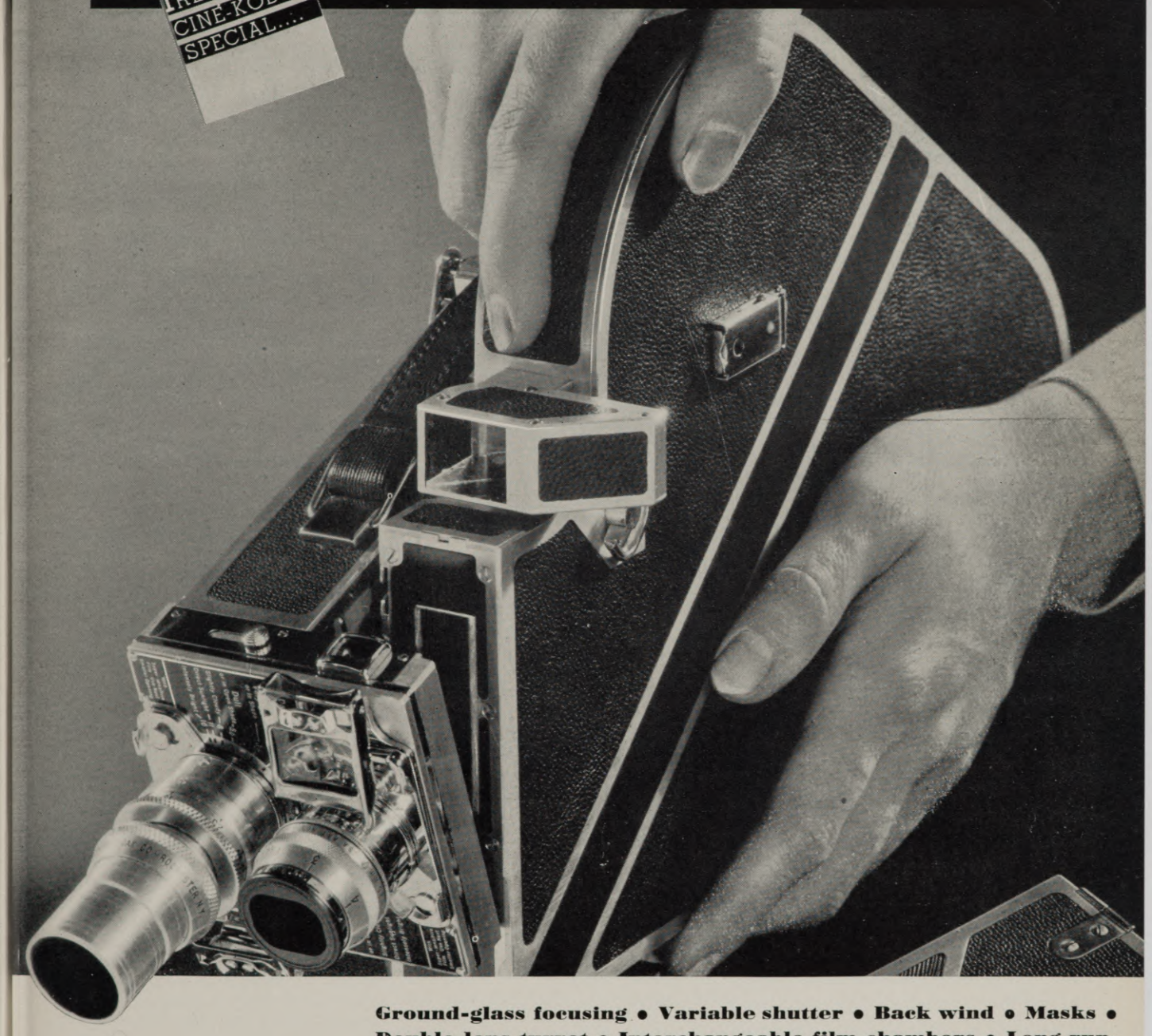
● A new German miniature camera for 35mm stock is being marketed by the German Eastman Kodak, Ltd. This little camera is said to be very much along the lines of the original Leica camera and sells for around $30.00 at the present rate of exchange. It is equipped with a compur shutter and an f3.5 lens.

The 16 mm. camera of professional scope

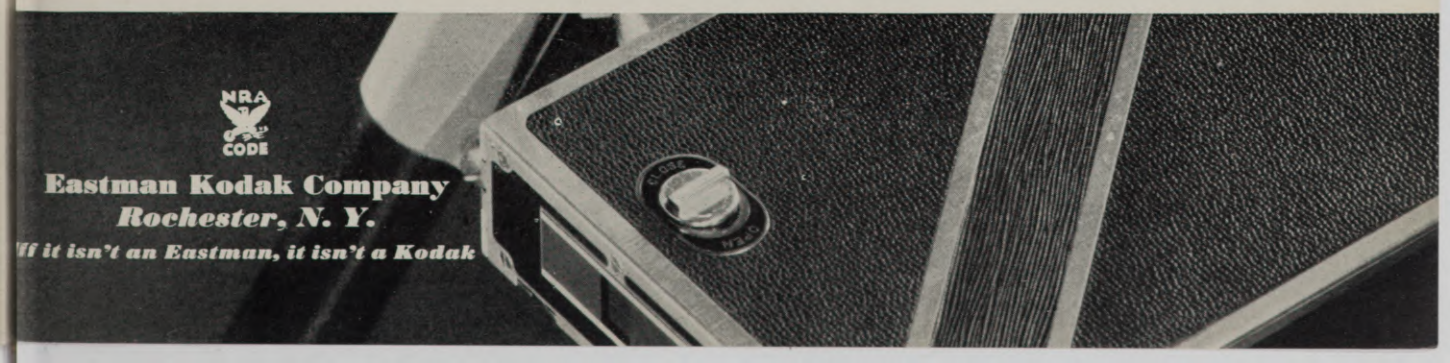
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WHEELS OF INDUSTRY

16mm Sound-on-Film Projector

● According to announcement made by the Ampro Corporation, that company is now manufacturing a 16mm sound-on-film camera. They operate under license granted by R.C.A. Victor Company according to their statement.

Slow-Speed Device for Leica

● A new attachment which gives shutter speeds from 1 to 1/8th second exposures on the previous models of the Leica has just been announced by E. Leitz, Inc., 60 East 10th Street, New York City.

The new slow-speed device is especially useful to owners of Leica cameras other than the model F, which has these slow speeds built into its mechanism, as it makes possible slower automatic speeds by simply attaching the device to the camera over the shutter release button. Owners of Leica models A, C, D, and E will welcome this device because the slowest speed their shutters are capable of, automatically, is 1/20th second. Many have had their cameras converted into the model F because of these slower speeds. With this device now available, conversion is not necessary.

New Miniature Projector

● As an addition to the series of Udimo projectors, E. Leitz, Inc., 60 East 10th Street, New York City, is announcing the new miniature projector known as the UMINO. The small projector is unique in that it accommodates not only film slides (both single frame ¾x1-inch and double frame 1x1½-inch), but also 2x2-inch glass slides.

The miniature projector measures 2½x5x7 inches, and weighs only 2½ pounds complete. A highly-corrected projection lens is supplied in focusing mount, and the illumination is supplied by either 50- or 100-watt, 110-volt lamp. For special requirements, an adapter may be installed whereby the illumination is furnished by a standard automobile storage battery, using a low-voltage lamp. This new projector is manufactured in the United States.

Sound-on-Film Catalog

● Klein & Goodman have issued a 16-page catalog of their sound-on-16mm-film subjects available for rental. It includes 200 subjects with a total of 400 reels. These are broken down into Features, Westerns, Super Specials, Musicals, Novelties and Revues, Travel, Cartoons, Sport Subjects and Educational. Catalog will be mailed on request to Klein & Goodman.

Bass Rental Catalog

● Bass Camera Company announces a new 64-page 16mm Film Rental Catalog. This catalog includes silent pictures, sound on disc and sound on film, according to the announcement of this company, and will be mailed upon request within a radius of 1000 miles of Chicago.

The same announcement tells of Bass Bargaingram No. 214 which will also be mailed on request.

B & H Branch Library

● The Bell & Howell Filmo-Sound Rental Library announces the establishment of the following branches: Auditorium Supply Co., Minneapolis; Burgart Bros., Tampa; Photoart House, Milwaukee.

The library is said to specialize in 16mm sound-on-film subjects and claims over twenty branches in various cities of the country.

Lens Folder

● A new six-page folder on Bausch & Lomb Tessar Lenses has just been issued at Rochester. This folder is illustrated with examples of photography from this series of lenses and carries schematic drawings showing the arrangement of the elements in the barrel.

Six primary uses of the Bausch & Lomb Tessars are listed indicating the versatility of this series. These uses are given as: action, or news pictures; child portraiture, aerial photography, nature pictures, copying and enlarging and medical and biological.

Revised "Leica" Darkroom Manual

● The familiar brochure, "Developing, Printing, Enlarging Leica Pictures," by Willard D. Morgan and Karl A. Barleben, Jr., F.R.P.S., has just appeared in a sixth edition. Essentially the same as earlier editions, it has been revised and amplified to include the latest in methods and equipment for miniature camera darkroom work. Especially valuable is the added information on the popular Paraphenylene-Diamine developers: not only are general formulae given, but special formulae for definite types of film, including super-speed, regular pan, and special fine-grained panchromatic emulsions. Another welcome addition treats the Lumiere Filmcolor and DuPont Dupac natural-color processes.

There is a chapter on the use of photo-electric exposure meters, by A. T. Williams, of the Weston Electrical Instrument Corp. Other added information concerns the latest "Leica" darkroom and copying equipment, and the new technique of enlarging with illumination control and Photoflood lamps.

Brick-Board

● A new material, designed to take the place of cast-plaster brick panelling for set-construction, has been patented by David S. Garber, Art-Director for Universal Studios. The new product, known as "Brick-Board," is understood to be made of a paper-pulp composition, which may be colored throughout in any desired shade, rather than painted on the surface alone. It is held to be waterproof, excellent acoustically, and, according to Garber, will be placed on the market within the next month.

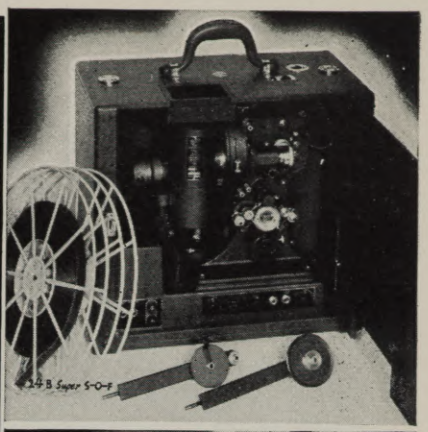
Single-Exposure Leica Camera

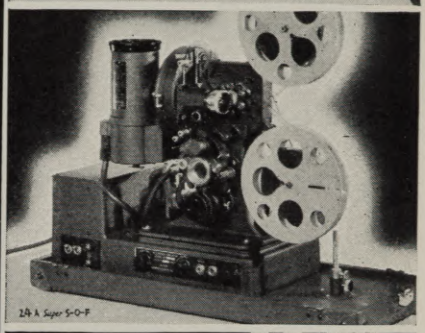
● Many miniature camera enthusiasts often wish to make one exposure and develop it immediately. With the usual camera this may not be so convenient. With this idea in mind, E. Leitz, Inc., offers the Oligo Single Exposure Leica camera. The Oligo is an interesting little device. It consists of a metal housing, the front of which is threaded to accommodate any of the Leica lenses, and the rear is fitted to accommodate a special ground-glass focusing screen and special film holders interchangeably. A special Ibsor shutter which fits over the lens and provides the exposure-speeds completes the outfit.

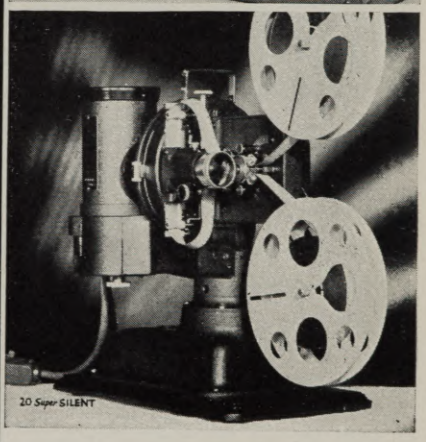
The film holders are sturdily constructed of metal, and hold a single 1x1½-inch film which may be cut from a 35 mm film roll. Sharp focus is established by the ground glass back.

The Oligo camera is convenient for making test shots, for copy work, and for all other uses where but one exposure is necessary.

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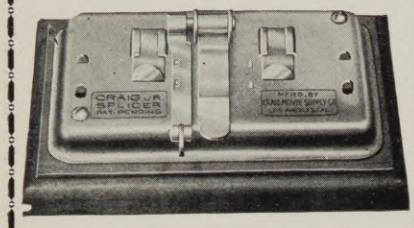
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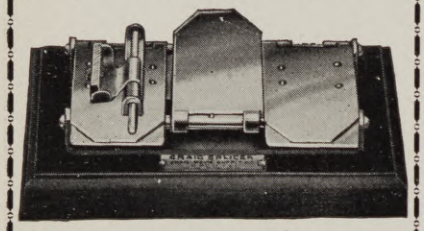
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CONTINUITY WITH SIMPLE CAMERA-TRICKS

Continued from Page 270

Scene 19. Long-shot, over the heads of the audience. Two sheets have been strung up, as curtains: Jack and Joe rise up from their "orchestra pit" and draw them apart, revealing Junior, standing beside a table in the center of the "stage." He bows deeply; cut just as he starts to rise.

Scene 20. Close-up of Junior, just straightening up from his bow. He has made himself up with gorgeous painted moustachios and goatee; he speaks:

TITLE: "Ladeez and Gentulmun! The Great Mogul will now astound you with his mystic Magic!"

Scene 21. Medium long-shot, panning from left to right, showing the audience applauding wildly.

Scene 22. Medium-shot of Junior. He takes an apple from his pocket, and lays it on the table. He removes his hat, and places it over the apple. He waves his wand, taps his hat once, and when he raises the hat—the apple is gone. Junior bows.

Scene 23. Same as Scene 21: the audience is quiet, astonished.

Scene 24. Medium-shot, as Scene 22. Junior puts the hat on the table, makes another pass—and when he raises the hat, the apple is there again.

Scene 25. Medium-shot of audience. One youngster gets up and speaks:

TITLE: "Aw, that ain't a real apple!"

Scene 26. Close-up of Junior. He tosses the apple straight into the camera.

Scene 27. Close-up of the boy who spoke; he catches the apple, looks at it, and surprisedly bites into it as he sits down.

Scene 28. Medium-shot of Junior. He picks up an egg, and puts it under the hat. When he raises the hat, there is a chicken! He covers the chicken and waves his wand.

Scene 29. Close-shot of the hat: Junior lifts it, and reveals a cat in place of the chicken.

Scene 30. Medium-shot of Junior. He covers the cat with the hat, waves his wand, and when he raises the hat, the cat has vanished.

Scene 31. Close-up of Junior, speaking:

TITLE: "Now—the greatest trick of all! I'll make somebody DISAPPEAR in front of all of you! Step up, please—anyone."

Scene 32. Close-up of Junior as he finishes speaking.

Scene 33. Long-shot of audience. Unbelievingly, they stare at each other; finally the young skeptic who ate the apple gets up and walks toward the camera, approaching until he completely fills the screen.

Scene 34. Long-shot of Junior. The Skeptic comes up on the "stage" and turns to face the camera. Junior takes a large black cloth and waves it around a moment, then holds it up in front of the Skeptic, so that the boy is completely hidden.

Scene 35. Series of very short "flash" big-head close-ups of the children in audience—wide-eyed and expectant.

Scene 36. Same as Scene 34. Junior drops the cloth—and the Skeptic is nowhere to be seen. Junior bows proudly.

Scene 37. Long-shot of the audience. They applaud wildly, then crowd forward, all talking at once.

TITLE: "Make us all disappear!"

Scene 38. Medium long-shot of Junior, as the children crowd around him. He motions them to get back.

Scene 39. Reverse angle from Scene 38: the children drop back a few steps and wait expectantly.

Scene 40. Medium close-up of Junior. He makes several passes with his wand.

Scene 41. Same as Scene 39. The children are standing, waiting—and suddenly they all vanish.

Scene 42. Medium long-shot of Junior. He smiles proudly, looks around over the vacant seats, then takes off his hat, puts down his wand. Then he wanders over to a chair, sits down in it, and falls asleep. SLOW FADE OUT.

Scene 43. FADE IN SLOWLY. Medium close-up of Junior, in bed and asleep. His mother's hand is shaking his shoulder, trying to awaken him. In his arms is clutched the book, with the title, "How to be a Magician" showing prominently.

Scene 44. Close-up of Junior, with the book, if possible, also in the picture. He smiles contentedly in his sleep. FADE OUT.

THE END

The vanishing tricks can be done very easily. Simply put the camera on a tripod, and when you reach the part of the scene where you want the disappearance, stop the camera. While it is stopped, remove whatever is to disappear, taking pains that nothing else moves; then continue your scene. If you do it carefully, the stop won't show on the screen.

Tricks and Gadgets

Continued from Page 275

size and shape of a phonograph record and print your three, four or more titles on this circular title-card, spacing them equally around the disc. Then shoot the first title for the required length of time. Then revolve the turntable until your next title is centered, expose this for the required length of time, and continue to your next title. (Of course, the camera must be continuously functioning throughout the foregoing procedure.)

A clever variation of the above trick is to center your camera on the rotating center of the turntable, center and lay your first title on the table, and start both camera and phonograph into functioning. Stop both when the title arrives at the 180° point of its revolution (that is, when your title is upside down), place your second title on top of the first (also in an upside-down fashion), and again start camera and phonograph into functioning simultaneously. When your title reaches the right-side-up position, stop the phonograph (turntable, of course) **only,** expose the title for the required length of time, and again resume turntable rotation until the 180° point (upside-down title) has been reached. Here you place your third title and repeat the above procedure. Be sure to expose your first title for a few seconds before rotating the same.

On the screen, this mysterious changing of titles will be amusing to watch, for as soon as one title has been read, it will revolve once, but a new title will have taken its place during the revolution.

LOUIS A. INSERRA,
Omaha, Nebraska.

Minnecam Portraiture Guide

● George W. Hesse, known as a contributor to these pages, is the author of "Portraiture with the Miniature Camera," recently published by the Fomo Publishing Co., of Canton, Ohio. While perhaps not as fully illustrated as a work on this subject should be, Mr. Hesse has treated his subject in workmanlike fashion, and covers in a very practical fashion, every essential phase of miniature-camera portraiture, from the exposure to the finished, mounted enlargement.

Among the topics discussed are the actual making of the portrait—composition, posing, lighting, exposure, and the like; make-up for portraiture (suggested as a substitute for retouching, which is, of course, impossible with miniature negatives); developing the negative — including formulae for fine-grain and physical development, intensification and reduction; making the print, including several excellent developer formulae; tinting and toning prints; and data on finishing, spotting and mounting portrait-prints.



Free Booklet from **E. LEITZ, Inc.** Dept 589, 60 E. 10th St., New York

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Control for Photofloods

Continued from Page 274

influence whatever on the low "speed" as long as the capacity of the device is not exceeded. High "speed" and low "speed" are sufficiently close to each other to make the judging of the relative photographic values of colors simple. Centralized control is a great convenience. One switch, at the back of the camera, controls all the lights. There is no violent burst of light when the switch is operated as there is with the series-parallel system. And, finally, it is worth repeating that low "speed" is constant, regardless of the number of lamps connected, as long as the capacity of the device is not exceeded.

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HINTS ON INDOOR CINEMATOGRAPHY

Continued from Page 271

The reflective values of wall-surfaces are also important, especially in the longer shots. Naturally, a dark wall will require more light than a highly-reflective, light-colored wall.

Such a wide variety of lighting-units is available to the amateur filmer that it is hardly necessary to discuss the matter of equipment here. Moreover, it is not necessary to restrict yourself to any one type of lighting-unit, for Photofloods and the older type 500- and 1000-watt units may be used together. The main thing is to have plenty of lamps, for while you can make excellent close-ups with but two lamps, you will need half-a-dozen or more units for really satisfactory long-shots. It is wise to equip yourself with several of the inexpensive Photoflood units which have rubber-covered clamps: not only are these units very handy, but they are very useful in backlighting, etc., for you can clamp them to curtain-rods, moldings and the like, and get lights from higher positions than most stand-lamps permit. Certain types of reading and bridge lamps, when fitted with Photofloods, also make very useful photographic lighting units. Certain accessories will prove invaluable: tracing-cloth or oiled-gelatine diffusing screens, for example, will give you a nice soft light especially desirable for photographing women, while concentrator "snouts," described in the March, 1934, issue of this magazine, are a great help in backlighting, as they help bridge the gap between ordinary lamps and the spotlights so few amateurs can afford.

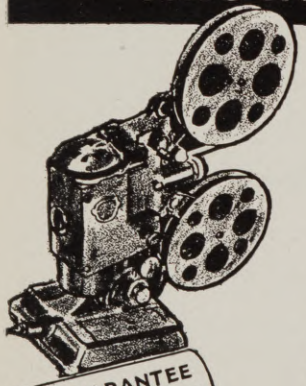
When it comes to the actual lighting, the illustrations may be useful. Fig. 1 shows a typical close-up lighting. Two lights are sufficient, and the light is balanced by having one light—in this case, the one on the right of the camera—considerably closer to the subject than is the other. In close-ups, it will be noticed, the units used for lighting the subject can usually do double duty and illumine the background as well.

Fig. 2 shows a medium-shot: for this, five lamps are the minimum needed for satisfactory lighting. The units numbered No. 1 and No. 2 still serve the same purpose as in the close-up—lighting the subject. Lamps Nos. 3 and 4 are intended primarily to light the background, and lamp No. 5, which is placed high, out of the picture (preferably one of the clamp-type Photoflood units) is for backlighting the subject, to separate him from the background.

In Fig. 3, we see a long-shot: naturally, as a greater area is included in the picture, a greater amount of light is needed, so we use seven lamps. Again lamps 1, 2 and 5 provide front and back light for the subject, while lamps 3 and 4 are assisted by Nos. 6 and 7 in lighting the "set." This is, of course, merely an elementary layout: for in actual practice you will find use for several additional units in lighting the set, the furniture, and the like—adding to the effects of depth and relief with highlights on curved surfaces, casting interesting shadows, and so on. Low-powered bulbs in the wall-fixture should be turned on—not for any photographic value, but because, if they definitely appear lit, you

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will have a logical source from which your backlight will appear to come.

Several practical suggestions can be made: for instance, never attempt such shots (or any serious camerawork, for that matter!) without a good, deep lens-shade — and never let the direct rays from a lamp strike the glass elements of your lens; this would produce a flare or "ghost." Likewise, don't be afraid to place your stand-lamps high on their supports — preferably well above the head-level of your subject. If you are working in Kodacolor, you will need at least double the amount of light you'd use for black-and-white — especially in frontlight. Remember that your effect depends, not alone upon light, but upon the balance of light and shadow—so, wherever you can, keep a watchful eye out for opportunities to paint upon your set with interesting shadows. Lastly, notice that in the illustrations the subject is not crowded close up against the back wall, but (especially in the longer shots) brought well out from the wall. In a close-up, it is not so important to play your action well away from the walls; but in longer shots it is imperative. Otherwise, you will not be able to light either subject or set properly, or to get a natural effect. It is a good idea to make it a rule that the greater the area covered in your shot, the farther out from the wall the actors should be placed. Above all, try to make your effects natural, rather than artificial, for you aren't lighting your set merely to illuminate it, but to give a natural and artistic effect. And once you understand lighting, artistry, as well as mere illumination, is easy.

Making Silent Movies Talk

Continued from Page 272

proper care of them, these records — while by no means permanent—last surprisingly well.

Most of these home-recording phonographs have provision for recording from radio-programs, too: and you frequently use this feature when you want to record a musical accompaniment for silent films such as scenics, and the like. Most radio performers are glad to accommodate with requests, and it is easy to arrange to have them play the number you want to use for a score on some definite programme, when you can record it. I have even used such request numbers to provide an orchestral accompaniment to songs I wanted to record for one of my pictures.

It is also possible to get some interesting results synchronizing your pictures with commercial phonograph records. For this, since the sound is already made, you simply use a portable phonograph, and play the record while you photograph the picture; your actors, of course, talk and sing with the record—and the result on the screen is that your actors appear to be singing with, for example, the voice of Bing Crosby or Marlene Dietrich—or even my own voice!

Best of all, this system makes it possible to make home talkies no matter what sort of film equipment you use, for obviously the idea will work just as well with 8mm or 9.5mm equipment as with 16mm. In this respect, it is absolutely the only way I have heard of for getting sound with the smaller films.

Incidentally, when I talked about the idea with some of the real old-timers of

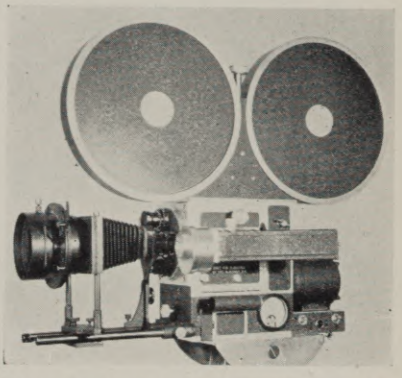
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Here Are the Rules---Read Them

This Contest is open ONLY to AMATEURS. No professional cinematographer will be eligible to compete.

The Contest ends at midnight of October 31, 1934. All pictures must be entered by the closing date or they will not be considered. Entries, mailed or expressed, bearing a date not later than October 31, 1934, will be accepted.

Pictures submitted in this contest will be judged for photography, composition, direction, acting, cutting and entertainment value. The judges will include outstanding and widely known cameramen, directors, actors, writers and a group of nationally known motion picture critics.

The decision of the judges will be absolutely final and there can be no appeal from their decision. Announcements of the awards will be made as soon after the close of the contest as possible and checks and prizes will be sent the winners.

Pictures may be submitted either by individual amateur movie makers, or they may be submitted by amateur movie clubs. However they must be photographed on 16 millimeter, 9½ millimeter or 8 millimeter film. Each entrant must have his entries accompanied by the sworn statement which will be sent him to fill out. No pictures will be accepted which were photographed on 35 millimeter film and then reduced.

Contestants may enter as many subjects as they desire. One entry blank will cover all subjects put in the contest by that entrant.

The contest is open to amateurs and amateur clubs anywhere in the world.

The $1000 in cash will be divided very simply. There will be a grand prize of $250 for the best all-around picture. There will be from 10 to 15 prizes in the various classifications of $50 each. There will be such classifications as Scenic, Travel, Educational, Scenario, Home Movie, Kodacolor, Technical and any other classifications which might be brought forth by the entries made.

The American Cinematographer reserves the right not to declare a prize for any classification, if in the opinion of the judges, there is not a picture submitted sufficiently good to be classed as a prize-winner.

The American Cinematographer also retains the right to make duplicates of such prize-winning pictures as it may indicate, for free distribution to clubs and amateur organizations throughout the world.

If you intend to enter the contest please send coupon on this page for official entry blank.

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Please send me one of your official entry blanks. I intend to enter a (16mm 8mm 9½mm) picture in your 1934 contest. I understand my entry must be in your office not later than October 31, 1934.

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the film business, I found that I had unwittingly gone back to the very earliest methods of making talking pictures. Of course, we all know that the first successful commercial talkie system was the sound-on-disc Vitaphone: but years before that, commercial talkies were made by this same method of making the picture first, and later synchronizing a disc record made while the picture was projected. It worked quite successfully for the professionals of twenty-odd years ago—and it will work just as successfully for the amateur of today. Besides, it opens up a new field in home-movie making, and endless possibilities for pleasure. Try it!

Book on Miniature-Camera Color Pictures

● "Color Photography with the Miniature Camera" is the title of a booklet just received from the Fomo Publishing Co., of Canton, Ohio. In it the author, Luis Marden, makes a welcome addition to the literature of both natural-color photography and miniature-camerawork, as he details many processes developed since the publication of most standard works on color photography, and treats excellently the hitherto virgin field of natural-color picture-making with "Leica," "Contax," "Rolleiflex" and kindred miniature apparatus.

Among the many processes discussed are: Lumiere "Autochrome," "Filmcolor" and "Lumicolor;" Agfacolor plates and films (including the Agfacolor lenticulated Keller-Dorian 35mm film-system); Finlay color plates; Trichrome Carbro; Belcolor; Three-color bromoil transfer and gum-bichromatic printing from color-separation negatives; DuPont "Dupac" and Eastman "Zelcras" bi-pack two-color processes; Ives' "Polychrome;" Pinatype; Dyebro; and imbibition printing from Ives' "Polychrome." All necessary formulae are given, as are full practical instructions for exposure, developing, printing methods, and mounting. A brief historical resume of the basic facts underlying all natural-color photography is appended.

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Rates: Seven cents a word. Minimum charge, one dollar per insertion.

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FOR SALE—3¼x4¼ Korona Pictorial View camera case, 11ex Acme shutter, six cut-film holders. Box 241, c/o American Cinematographer. T

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Another Contest

Here's how it works. Send us in tricks you have done in filming with your 8mm, 9½mm or 16mm camera. Explain them to us so that we can explain them to others in the pages of American Cinematographer.
For every one we publish you will be entitled to your choice of one of the prizes listed below.

By Gadgets we mean little pieces of equipment you have built, designed or devised. Equipment that works. Little gadgets you have added to your camera, projector or otherwise. For instance, we heard of one fellow who built a splicer out of a mouse-trap . . . that's a gadget.

What kind of gadgets have you made . . . what sort of tricks do you do with your camera or equipment? If necessary send us a rough sketch or a snap shot of your equipment if it will help describe it better and quicker.

Here's Your Chance to Win Equipment or Film

Frequently we have published what might be termed tricks. Such as making distorted effects by pouring sweet-oil over a glass in front of the film. Others have been published from time to time.

In the way of gadgets we have reported many things from the building of a complete 16mm camera by amateurs down to making their own reels.

What Have You Done?

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